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*FROM SOURCE
TO SEA*

W. POWELL JAMES, M.A.

FROM SOURCE TO SEA.



FROM SOURCE TO SEA.

FROM SOURCE TO SEA:

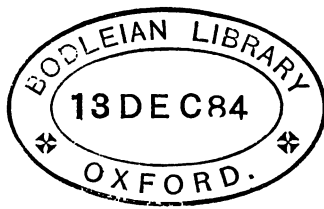
OR,

GLEANINGS ABOUT RIVERS IN MANY FIELDS.

BY

W. POWELL JAMES, M.A.,

AUTHOR OF "GUESSES AT PURPOSE IN NATURE."



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PREFACE.

A PREFACE is only pardonable when the author has something to say. In the present case he feels bound to state briefly what is the exact position of the little work thus introduced to the public. It is not another treatise on Physical Geography; it aims rather at being an interesting supplement to one chapter in that delightful science.

Rivers are selected from the great features of the earth's surface,¹ and an attempt is made to develop the various points of view from which they may be regarded. They are treated successively as physical phenomena and geological agents, as elements of picturesque scenery, as the seats of vegetable and animal life, and as connected with the history, religion, and industry of man. Finally, a slight contribution is made to the difficult task of determining the meaning of their names.

In such a work originality cannot be expected so much as judgment in selecting material, and accuracy in using it. The student of Etymology, however, will notice some novel conjectures in the chapter on British names.

If the various gleanings thus brought together impart life and animation to the serious study of the Surface of the Globe, the object of this small volume will be fully attained.

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FROM SOURCE TO SEA.

CHAPTER I.

WHAT RIVERS ARE.

By ceaseless action all that is subsists.
Constant rotation of the unwearied wheel
That Nature rides upon, maintains her health,
Her beauty, her fertility. She dreads
An instant's pause, and lives but while she moves.
—*Cowper's Task*, book i.

As travellers approach the city of Rome, they are always struck with astonishment at the long lines of arches which cross the desolate Campagna. These colossal remains are what time and neglect have left of the many aqueducts of the ancient Romans. By their means copious streams were poured into the city from the spurs of the Apennines, flowing at one time in tunnels cut through the solid rock, at another in well-aired conduits carried across ravine or plain on double and treble rows of arches. If all the written records of Rome had perished, if her very name were lost, intelligent observers would easily infer the original purpose and office of these majestic ruins. In our globe, taken as a whole, there exist arrangements almost as obvious, the design of which is to supply the world with fresh water. They are, however, so far more wonderful than the aqueducts of the Romans, as their operation extends from Pole to Pole, is unceasing and incapable of serious derangement, and is brought about by blind unintelligent forces working in

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obedience to a Divine Plan. These arrangements are known collectively as the Circulation of Water. To this great system belong the refreshing dews of night, the flying mists of high mountains, the ever-shifting clouds, the gentle showers, the storms of rain and hail and snow that drench the earth, the fountains, lakes, and rivers that add so much to its beauty, the creeping glaciers of the Alps, the fantastic icebergs of Polar seas. All are but forms of water as it passes through its never-ending round of changes in its journey from the Sea to the Land, and from the Land to the Sea. In this great system Rivers are prominent and important links. They may be said, indeed, to be its most striking results, the most direct channels by which the water condensed from the air is sent back again to its original source. How this is done will be the subject of our first chapter; in other words, *what Rivers are at the present day*. But as incidentally they do a good deal of other work as well, which in the slow process of time has produced wonderful effects on the face of the earth, we shall devote the second chapter to Rivers as agents of geological change, or *what Rivers have done in the past*.

Evaporation.—If water is exposed in a dish, it will in time disappear, more or less rapidly according to the warmth and dryness of the surrounding atmosphere. What becomes of this water? It is evaporated, or passes into the state of invisible vapour, and is then absorbed by the air. Many experiments have shown that warm air can absorb and retain in the gaseous form much more water than cold; that after absorbing the moisture it is much lighter than before; and that air thus saturated, if suddenly chilled, parts with the vapour which it can no longer hold. Evaporation is almost always going on under ordinary conditions from every water-surface on the globe, and even from ice and snow. Though it takes place more actively under direct sunshine and a drying wind, it is not entirely interrupted by cold or darkness.

Let us now recall to our minds the significant fact that nearly three-fourths of the surface of our globe is sea, that is, an area of evaporation, and, moreover, that much of this sea is within sub-tropical latitudes—that is, is an area of excessive evaporation. It is instructive here to consult a good map of the world, or still better, an artificial globe. It will then appear that the Torrid Zone itself is a broad belt, indeed, it is estimated to contain $\frac{398}{1000}$ ths, or practically $\frac{2}{5}$ ths of the whole surface of the planet. This is already a high fraction, but for our present purpose we may add to it at least the space included by the annual isotherms of 60° Fahrenheit, corresponding, as far as the Sea is concerned, pretty nearly to the parallels 37° of North and South latitude. This central girdle of 74 degrees of latitude, more than half the surface of the globe, will thus represent an area of constant evaporation. We at once notice how much of it is occupied by the ocean. It is true that nearly all Africa and Australia, and much of South America will fall within these limits, but they still leave an enormous preponderance of sea. A simple experiment will illustrate this statement. Let any one trace the line of the Equator round the planet. He will find that of the 21,600 geographical miles or knots which make up its whole circuit, only 4,700 are land, that is, less than a quarter. Then again, north and south of this line spread the immeasurable wastes of the Pacific, hardly interrupted by scattered groups of small islands. Add to this great sea the basins of the Atlantic and Indian Oceans which lie within the limits assigned above, and we see what a huge cauldron of simmering water is found within the *Zone of Constant Evaporation*. We may venture to give it this name, as it enjoys perpetual summer, or what we natives of Great Britain would call summer, and also as during every hour of the day it has the sun shining directly upon some sea-surface within its limits. An inspection of the map will show that over this belt the least

evaporation would occur between 10° and 40° East longitude, where there is much unbroken land, but even between these meridians a large part of the Mediterranean and Red Seas as well as the immense lakes of Equatorial Africa are found. North and south of this Zone, though not sharply separated from it, are regions which may be called the areas of intermittent evaporation. It is plain that in both these, as the length of the day increases in summer, even up to the three-months sunshine of Arctic latitudes, there must be considerable evaporation during that part of the year. At the same time there will be a marked difference in the quantity of vapour raised in the Northern and Southern hemisphere, as the area of water-surface differs so greatly. In the Northern we find the largest uninterrupted masses of land in our planet, the greater part of the Euræo-Asiatic Continent, and also of that of North America. On the other hand, in the corresponding Southern Zone, the Sea predominates in a remarkable manner. Below the assumed parallel 37° S., the only land we find is the tapering extremity of South America, together with a few islands and the unexplored circumpolar region. During the short Antarctic summer, we know that evaporation is so great that the sun in those regions is rarely seen, owing to the incessant fogs, rain, or snow-storms.

In addition to the vapour derived from the Sea, we must add the comparatively small amount exhaled from lakes and rivers and even forests. Here then, in the watery particles which are constantly rising from the Sea, and especially from the warmer zone between 37° N. and 37° S., are we to look for the ultimate birthplace of rivers, and indeed of most, if not of all the fresh water of the globe. Let us pause here for a moment to reflect how different would have been the distribution of climate in our planet, if dry land had predominated in this central belt. Suppose, for instance, the continent of Africa had stretched on in an unbroken mass

to join South America, and were then prolonged round the globe to meet Borneo and New Guinea. The air-currents that would rise from this vast surface of land heated by a vertical sun would be hot and dry, like the winds of the Sahara district, even if modified locally by ranges of mountains. The area of evaporation would be immensely shrunken, and the clouds formed in it would be dissipated by the burning Equatorial winds. The result would be that the present Temperate Zone would consist of dry riverless wastes, except in a few favoured spots. The Polar regions would possibly be much warmer than they now are, but, considered as habitable countries, they must always suffer unavoidably from the three-months absence of sun in winter. It is only right, however, to add that the modern school of geologists believe that the present ocean-basins and continental outlines are of great antiquity, and that the general direction of land-masses from North to South can hardly be accidental. Our imaginary hypothesis probably represents a state of affairs that has never actually occurred in nature, and never will occur.

Condensation and Precipitation.—Let us now follow the course of these vast masses of water-vapour which the sun raises by a process of natural distillation from the surface of the ocean. This will vary in its details according to the latitude. In the Torrid Zone the products of evaporation, mounting perpetually with the ascending columns of heated air, arrive at a cooler stratum of the atmosphere, and are there condensed into clouds. On each side of the equator there is a narrow belt where these clouds are almost immediately further condensed and precipitated again in violent rain. These belts follow the course of the sun, and consequently shift their position a little in the course of twelve months. The eminent naturalist, von Martius, thus describes a day at Para, near the mouth of the Amazon:—Almost all round the year, he says, the same weather occurs at the

same hour of the day; the morning is bright and cloudless, the mid-day is oppressive, sultry, and overcast, the afternoon is marked by a terrible thunder-storm, in which sheets of water fall from the sky, and before sunset all is again calm and smiling. To this vast amount of rain, combined with heat, is due the astounding vegetation of the Amazon basin. Objection has been taken to the apparently useless fall of rain on the sea. But two considerations may be alleged in answer—(1) that the two zones of constant precipitation form together a very narrow belt, part of which after all *crosses the land*, and (2) that there is no such thing as waste in nature. The water must return sooner or later to the sea, to make up for the loss by evaporation. Rain falling back again from the cloud into the sea is not wasted—it has simply returned to its goal by a short cut, and shirked, as it were, its other work in the world for that turn. But only a small portion is thus abruptly precipitated. The greater part of the clouds are caught up and carried away in different directions by an elaborate system of winds. When and where they will be still further condensed is a matter of latitude, local configuration of coast, season of the year, and of the other complex conditions of climate. Some may be chilled by an icy current of water from the north or south pole, and brood over the face of the deep as immense fog-banks; some may strike against the cold surface of high mountains, and descend as snow or rain; some may drift away to the Polar Seas, fall as snow, and, gradually changing into ice, remain for centuries or millenniums parts of a glacier, until they are finally released as icebergs and melt back once more into their native sea. Of the water which falls on land as rain or snow, some is absorbed by the soil and the vegetable world, some is stored up in underground reservoirs, or in the great natural basins we call lakes, or in the form of snow on mountain slopes, and the rest runs off in rivers.

Classification of Rivers.—It is clear that any classification

of rivers must be to some extent artificial. One water-course is essentially the same as another, differing mainly in rapidity, length, number of tributaries, area of drainage, &c. It has been usual with Ritter to divide them into Oceanic—those which fall into the sea, and Continental—those which discharge their waters into lakes, marshes, or sandy deserts. So far as it goes this is a distinction, but it is one which only belongs to the latest phase of the development of the earth. Perhaps we learn more from the classification which takes as its principle the simplest function of rivers—that of carrying off surplus water. We may thus divide them into (1) perennial streams, and (2) intermittent streams or torrents; the former being perfect or fully developed, and the latter imperfect or rudimentary rivers. But perennial rivers are so merely because they can draw upon a permanent supply. According to the nature of this supply, then, they may be subdivided into (1) those which are fed by springs, (2) those which originate in glaciers, and (3) those which are the outflow of lakes, or (4) of peat-mosses.

Rivers Derived from Springs.—This class is far the most numerous, and may be considered as the normal type. As a rule the head of such a river is a fountain or spring which is the escape-pipe of an underground reservoir of water. The rill thus issuing forth from the bowels of the earth is soon augmented by other rills; it becomes “a brook of loud and stately march,” and the brook, if it has sufficient space allowed it, broadens into a river. The number and copiousness of springs depends partly on the amount of rain in the district, and partly on the geological character of the rocks. They occur most freely where a porous bed lies immediately over one of a harder or stiffer nature, as sand over clay. All rocks are to a certain extent permeated by water, but chalk and other varieties of limestone absorb it like a sponge. Besides the evident springs, water often escapes in obscure spots on hillsides, indicated

only by unusual greenness and the growth of rushes. A famous river, it is evident, takes its rise usually from many sources. A glance at a map of Palestine will suffice to show that this is for instance the case with the Jordan, the source of which was disputed even in antiquity. The proper origin of the stream is not so much in the noble gush of water at Bânicas or at Tell-el-Kâdy as in the bursting fountains and welling streams which flow down from the entire slope of Anti-Lebanon.* There is a similar uncertainty about the head of the Thames, though local tradition usually fixes upon one spot to the exclusion of the rest. These fountains are usually very permanent. The spring of Arethusa, on the eastern coast of Sicily, has witnessed the rise, the greatness, and the fall of the neighbouring city of Syracuse; Horace's Well, Bandusia, has outlived the empire which the poet thought eternal; and the sources of the Clitumnus are as copious and translucent to-day as when Pliny the Younger wrote a delightful description of them. In the Holy Land changes of dynasty, war, and conquest, have swept away almost every building which dates from the Christian era, but the Virgin's Fountain at Nazareth, and Jacob's Well near Shechem, are sites which no scepticism can assail. The Oases in the Great Desert of the Sahara have been inhabited from time immemorial, and owe their existence entirely to the permanence of springs. It is always a beautiful sight to watch the gush of clear crystal water issuing from the mysterious bowels of the earth. But it does not always happen that the traditional source of a famous river corresponds in size to the historical importance of the stream.† The springs of the Danube and the Thames have nothing remarkable about them. On the contrary, some of the most picturesque

* Smith's *Dictionary of the Bible* (article *Jordan*).

† Many celebrated rivers issue from glaciers or lakes, and will be treated of in subsequent paragraphs.

fountains in the world give birth to small streams which soon lose their individuality in a larger river or in the sea, as for instance Vaucluse (*Vallis clausa*, the *Shut-in Valley*), the origin of the Sorgues, a small tributary of the Rhone. This famous spot, associated with the tender melancholy of Petrarch, is near the village of the same name, about 15 miles from Avignon. It is a deep recess in the mountain side nearly surrounded by a precipitous wall of rock. At its further extremity about twenty streams issue from the base of the cliff, forming the brook Sorgues, and after a short course fall into a circular rocky basin about 65 feet in diameter, with a funnel-like pipe in its centre of unknown depth. In this basin the waters maintain themselves at varying heights, but it is thought to be fed as well by subterranean channels from the melting snows of the neighbouring Alps.—(Figuier, *La Terre et Les Mers*, p. 326.) Another very striking stream that issues from a cave in the base of a bold cliff is the Bistritza, an outlet of the Zirknitz Lake in Carniola.—(Klein's *Physische Geographie*, p. 204.)

Rivers Derived from Glaciers.—If a river takes its rise in mountains of sufficient height to reach the line of perpetual snow, the torrents that form its upper course will originate in glaciers. The Rhine, the Rhone, the Arve, the Inn, are all examples of this class in the Alps. It is clear that we must not confine our attention to the one glacier which is locally considered the source of the river: it is fed from all within its basin. We are told that 370 glaciers occur in the basin of the Rhine, 137 in that of the Rhone, 66 in that of the Inn, and 35 on the southern slopes of the Alps that drain into the Adriatic. A glacier is under all circumstances one of the most wonderful sights of nature; not the least wonderful feature is the turbid river which escapes from the glittering cave of clear blue ice at its base. The colour of glacier streams is said to depend on the kind of rock which they have ground into

flour in their downward march. A greenish tint is ascribed to serpentine, milky white to granite, blackish to schistose rocks. Whether this be the true explanation or not, the tinge continues characteristic of the stream long after it has become apparently clear; thus the Rhine and Adour are distinctly green a long way from their parent mountains. How little stress can be laid on any hard-and-fast line in the grouping of rivers appears from the fact that the Danube must count as one rising in springs, while its Alpine tributary, the Inn, a much larger stream at their point of junction, derives its origin from ice and snow.

Rivers Flowing out of Lakes.—Perhaps the rivers which are really the overflow of lakes deserve as much as any to be considered as a class apart. A great number may be found in Scotland. For instance, we have Loch Ness discharging itself by the River Ness, Loch Awe by the Awe, Loch Lomond by the Leven, Loch Leven by another Leven: similarly the Teith and the Tummel carry off the drainage of several lakes. The River Ness may be taken as a typical example. The lake from which it issues fills a straight trough-like depression in the great glen of Scotland, and although 24 miles long, is only from one mile to one and a half broad. Its depth is great throughout, and in one place reaches to 810 feet, that is, to a lower point than any part of the bottom of the North Sea between Scotland and Denmark. Its surface is about 70 feet above the sea, and the river has that much fall to accomplish in the nine miles which lie between it and the sea as the crow flies. It is obvious that such a river as the Ness differs in many respects from ordinary streams. It is in fact a natural sluice or outfall channel. It has no stage of growth, and is subject to little variation of level. In one broad, swift and shallow stream it pours forth its clear brown waters to the Moray Firth, flecked with the foam from the broken surf of the lake-strand. The river is precisely the same in character, except that it is

deeper. But when we look at the map of Scotland we see that there is scarcely one of its many lakes which does not overflow in a stream. In Sweden and Russia these lake-rivers are excessively common. It is, however, in North America that this feature is presented to us on an enormous scale. Thus Lake Superior, 627 feet above the Atlantic, overflows into Lake Huron which is 32 feet lower. Lake Huron, after passing through Lake St. Clair, reaches Lake Erie, the level of which is lower by another 30 feet. Lake Erie passes by the channel called the river Niagara to Lake Ontario, 130 feet lower, and thence the enormous overplus of the whole gigantic system flows off in the magnificent fresh-water strait called the River St. Lawrence. Besides these famous lakes, Canada presents us with a great many other good examples, as the Chambly flowing from Lake George and Lake Champlain, and the Chaudière issuing from Lake Megantic. In the Equatorial regions, again, the Nile is now known to be the outflow of the Victoria Nyanza and Albert Nyanza, and the Congo is suspected to issue from other huge lakes. But even this group of rivers will be found on close examination to include distinct varieties. Where can a line be drawn between the intermediate stages which connect a stream which is plainly the sluice by which a great lake overflows, and a river which runs through a series of lakes? The Ness at one end of the chain, and the Jordan at the other, seem separated by a considerable interval. But what is to be said of the Shannon or the Havel? Are the lakes mere expansions of the river, or does the river, on the other hand, flow through them? In the flat countries of the Northern Plain of Europe it is incredible how many lakes are connected together by rivers. The Drewenz in Eastern Prussia is said in its course of 124 miles to link together 123 lakes. Why should this be the case? These questions all point to a very interesting problem of geology which is still unsolved—the origin of lakes. We cannot do more here than briefly recapitulate the received

opinions on this subject. Most geologists admit that lakes have arisen from various causes. Some may have been formed by the damming up of a river-valley by a landslip or moraine; others by a depression produced by a fault or dislocation of strata, or by forces of elevation; others were probably once arms of the sea, and have been isolated by the re-emergence of the land, as may be asserted with some confidence of Loch Ness, Loch Lomond, and the great subalpine lakes of Lombardy; others are rock-basins, scooped out, according to Professor Ramsay, by glaciers; others, which occur in limestone districts, have been, according to Professor Hull, chemically produced by the decomposition of the rock through the agency of the carbonic acid gas existing in the water, being "hollows dissolved out of the limestone floor;" finally, there are the circular lakes which, beyond any kind of doubt, fill the craters of extinct volcanoes. Want of data prevent theorists from attempting to explain hitherto the largest lakes of all—those of North America and Equatorial Africa. The more we reflect on the subject, the more clearly will it appear that every lake of any importance, and not obviously one of a series, has had a separate history—a history which must be sought in each case by distinct investigations of the geological character and local peculiarities of the surrounding country.

Whatever may be the final results of this branch of investigation, which offers some of the most fascinating problems of geology, as indeed does all investigation into the proximate causes which brought about the present surface of the land, there is no doubt about the actual every-day functions of lakes with reference to rivers. In the first place, they act a very useful part in regulating the flow of the streams which enter them. They receive the turbid flood-water, spread it out over a large surface, and allow it to escape gradually so as not to desolate the neighbouring countries. In thus checking streams, they also filter them, by causing the deposition of the sand and gravel which they bring with them from the

hills. All observers are struck by the contrast between the turbid waters of the Rhone and the Dranse, where they enter the Lake of Geneva, and the clearness of the united stream which issues from it. In the same way, one of the great elements in the beauty of Niagara is the extreme purity of the translucent green water. On the other hand, rivers also render a most important service to the lakes from which they flow; they prevent them from becoming salt. According to Dr. Archibald Geikie (*Physical Geography*, p. 276) "so constantly are salts present in fresh water, that any fresh-water lake where the only escape for the water is by evaporation, will eventually become salt." But, as a matter of fact, lakes nearly always have an outlet, unless lying in the bottom of a basin, the sides of which are nowhere interrupted.

Rivers Flowing from Peat Mosses. — Wherever small shallow lakes or pools abound, as is the case in most mountainous and in some low-lying districts, every stage may be observed in the process of their transformation into peat-mosses. These latter owe their existence to the growth of aquatic plants, and especially of the *Sphagnum* or bog-moss, continued uninterruptedly through long periods of time. So wonderfully does this vegetation fill up the space in which it has got a footing, that it infallibly succeeds sooner or later in turning the shallow pool or series of pools into what in some districts is well called a moss. But the water, though masked by its treacherous green covering, is still there, and often gives birth to a stream. The characteristic brown colour of these streams arises from decaying vegetable matter: it is familiar enough in Scotland and Ireland. Similar moors, on a much larger scale, occur in East Friesland, Oldenburg, and Holland, and give rise to sluggish rivers—the Vechte, the Hunte, the Hamme. Of a similar origin are the dismal cypress-swamps of Florida, from which also issue forth streams of chocolate brown.

Intermittent Streams.—We now come to the torrents of

hot desert countries which are only the temporary channels for sudden rainfall, as they are fed by no permanent springs. They abound in Arabia and Syria, where they are known by the Arabic name of Wady. In the summer they are deep abrupt clefts in the limestone hills, or shallow troughs in the sandy declivities, but during the winter rains they are violent water-courses. A fugitive stream of this character is described by Klunzinger as appearing near Kosseir, a port on the west coast of the Red Sea.—(Klein's *Physical Geography*, p. 291.) "A very wide and shallow wady," he relates, "here opens into the Red Sea, descending for about four or five miles of desert from a hilly district. In winter it is sometimes changed into a mighty stream which inundates the whole plain. This rise is sometimes so sudden that the inhabitants can scarcely save themselves. In December, 1864, the river flowed without any one in Kosseir having observed the fall of rain. Immediately, though it was the dead of night, the whole town sallied forth to see the rare sight, and to carry away the precious element that might so soon disappear again, and even to bathe in the rushing stream. Through the whole of the next day, men and women, asses and camels, were busily engaged in bringing in stores of the water. After some days pools still remained in the hollows of the ground, but they were fast becoming salt through evaporation." It is the absence of true rivers, rather than the want of rain, which has rendered the Sahara a hopeless desert. Recent travellers have told us that rain does fall in many parts of this frightful waste, but it runs off the ground in torrents, and is soon licked up by the sun. What the Sahara requires to make it fertile, is a high mountainous range to condense the clouds, and give birth to perennial water-veins, and this condition is obviously impossible. Even as it is, there are fountains at rare intervals; as they are always near some elevated ground, like other springs, they probably owe their origin to rain. But even considerable rivers in tropical Africa approach to

this wady character. The two Abyssinian affluents of the Nile, the Blue Nile and the Atbara, vary extremely in quantity of water. According to Sir S. Baker, these rivers are of extraordinary size during the heavy tropical rains, but shrink up during the dry months to a surprising extent. The Blue Nile ceases to be navigable, and the Atbara dries up in places altogether. Similarly in the arid central plains of Australia, the rivers in the summer degenerate into a succession of water-holes.

A faint resemblance to this phenomenon occurs in exceptional districts even in well-watered England. In the chalk counties where rain sinks immediately into the porous rock, certain brooks are known to flow only when the subterranean reservoirs of water are unusually full. They generally bear the name of Winter-bourne, which will be found in Wiltshire and Dorsetshire, if not elsewhere; a name curiously identical with the Homeric word for torrent. The present writer has seen such a brook of clear crystal water, about 10 feet wide and 2 deep, flowing over a grass-grown bed, on the downs below Sidbury Hill, not many miles from Stonehenge. At the same time it must be remembered that these temporary streams resemble the torrents of hot deserts only in their transient character. The Arabian water-courses fail because there is no system of underground veins to sustain them: the chalk-streams fail for the very opposite reason, that all the water circulation is as a rule underground. Below the dry elastic turf which covers their surface the chalk beds are at a slight depth saturated with water. Under ordinary circumstances this water circulates by subterranean channels: now and then, when the supply is unusually great, a stream bursts forth on the surface.

Length of Rivers.—Water must flow down hill. This is the statement of a very familiar fact, yet this fact has been enough to determine the course of mighty rivers, and to change the face of vast Continents. For it is clear that a

large river must require a large catchment basin to supply it with water, and a long slope to give it a long course. Hence we shall find the greatest rivers of the world where the most favourable conditions for their development occur. Such is the case in regard to three watersheds in particular. The simplest type is seen in the Andes, a lofty chain of mountains running down almost uninterruptedly from the top to the bottom of South America, and keeping close to its western shore. The elevation of this stupendous range has tilted the whole eastern side of the Continent so as to slope almost imperceptibly to the Atlantic coast. The isolated mountains of Brazil and Guiana do not seriously interfere with this general inclination. The consequence of the position of the Andes is that while its western declivity is very short and affords a mere rim of plain, its eastern plains, often wonderfully level, spread out in places for nearly two thousand miles. Hence we have three great rivers, or systems of rivers, the Orinoco, the Amazon, and the Rio de la Plata. The Amazon, with its enormous tributaries, catches the tropical rains which fall on both sides of the Equator, so that practically it is never low : it has been supposed to carry with it to the ocean a fourth part of the fresh water of the globe. In North America the relation of the axis of elevation to the Continent is not quite so simple, yet it shows the same general tendency. The Rocky Mountains lie sufficiently west to leave room for the enormous plains of gentle slope which have produced the Missouri, Mississippi, and their feeders, whilst another inclined plain sends the Mackenzie to the distant Arctic Ocean. The rivers which seek the Pacific have on the contrary to work their way through a wild mountainous region. Lastly, in Asia we see the effects of the elevation of a large table-land extending over twenty degrees of longitude, of which the Himalaya range is the southern limit. From the northern edge of this vast plateau the ground slopes to the Arctic Ocean, leaving room for the immense courses of the Yenesei,

the Lena, and the Obi; from its eastern side issue forth the Amour, Hoang Ho, and Yang-tse-Kiang; from its southern flanks the Indus, the Ganges, and the Brahmapootra.

In Europe the rising of the Alps gave the initial impulse which determined the slope of France, of the Rhine-basin, and of the Danube-basin.

The contrary to this arrangement may be seen in many volcanic islands, where the original cone has been symmetrically furrowed by tropical rains into torrent-beds. A map of Bourbon or Mauritius, for instance, both of which are of purely volcanic origin, exhibit streams of pretty much the same length starting from the flanks of a central peak.

Upper, Middle, and Lower Course.—The course of a large river may be usually divided into three stages—an upper, middle, and lower portion. The Rhine may be taken as a typical example. A number of rushing torrents, fed by snow and ice, and flowing through desolate ravines, meet in one channel with a northerly direction, by which the growing river falls into the Lake of Constance. In this basin the turbulent stream deposits its muddy burden, and issues forth with clear green water. Whilst still in Swiss territory it receives the Aar, an impetuous tributary which brings with it the greater part of the drainage of the Central Alps. On leaving Basel the middle course of the Rhine begins. It flows now as a noble stream through green meadows or beneath vine-clad hills. Its fall is still considerable, and its current rapid. On each side it constantly receives important affluents. At Cologne begins the lower course, in which the broad stream flows through a level plain with decreasing velocity. Before reaching the sea it divides into sluggish branches, and, indeed, practically loses its very name, as its principal arm is called the Wahl. Owing to the artificial character of Holland, intersected by canals and dykes, the estuary or final stage of all rivers falling into the ocean is not so marked in

the Rhine as in many other streams. Still there is a portion where the tide comes up, where the salt water mingles with the fresh, and where the mighty pulse of the sea is felt far away among the sleepy marshes. One has only to reflect for a moment to see how difficult it must be to get accurate statistics about the length of a river. The following figures are given for the Rhine in the most recent publications of Germany. The number of tributaries that fall into it amounts to 12,000: amongst these are the streams that issue from 370 glaciers in Switzerland. The direct distance of its source from its mouth is about 460 miles, the length of the stream is about 814 miles. The height of its sources above sea-level is 7,644 feet. Its basin has an area of 89,860 square miles. The reader may take these estimates for what they are worth.

Exceptional Rivers.—Many rivers deviate much from this typical example. Some have no Alpine course, others no estuary. Those which fall into the Mediterranean and its eastern adjuncts, such as the Nile, the Danube, and the Po, have an extraordinary opportunity for forming Deltas, as the tides of that inland sea are but insignificant. Still more is this the case with the Volga, which falls into the Caspian, with the Don and the Amou Daria and Sur Daria. At first sight it seems an odd destiny for a stream to end in a huge lake, but it must be remembered that inland seas such as the Caspian, the Aral, and the Dead Sea, are the shrunken remains of much larger expanses. In all probability the Caspian and Aral Seas were once united, and both connected with the Arctic Ocean. Their present isolation and consequent progressive diminution by evaporation is a comparatively modern feature in the face of the Asiatic continent.

But some streams have a still more ignominious fate, as they lose themselves in marshes, or are dried up in sandy wastes. This is particularly the case with the summit

of the great table-land of Asia, and with Central Australia. The streams either flow to the lowest level of a huge bowl, from which there is no escape, and there stagnate and evaporate, or else they are not strong enough to force a way through a barrier which blocks their valley. There is, however, in some districts a curious way of escape from this dilemma. When the bottom rock is limestone, the water, charged as usual with carbonic acid, dissolves it and makes for itself a tunnel through the ground. These are common in Arcadia, which is a high table-land shut in on all sides by mountains. The gulfs into which the rivers then plunge are known by the Greeks as *Katavothra* or *Swallows*. Similar phenomena occur in our own island in the Peak District, Derbyshire, as well as in some chalk counties. As might naturally be expected, wherever an extensive series of caverns is known, as the Mammoth Hole in Kentucky, many of these underground rivers are met with. The most singular instance, however, of this action of water is to be found in the scenery of parts of Carniola on the flanks of the Julian Alps. It is so well described by Dr. Archibald Geikie in his *Physical Geography* (p. 247), that we cannot do better than transcribe the passage:—"It is a table-land of limestone, so full of holes as to resemble a sponge. All the rain which falls upon it is at once swallowed up and disappears in underground channels, where as it rushes among the rocks it can be heard even from the surface. Some of the holes which open upon the surface lead downward for several hundred feet. Some turn aside and pass into tunnels in which the collected waters move along as large and rapid subterranean rivers, either gushing out like the Timao at the outer edge of the table-land, or actually passing for some distance beyond the shore, and finding an outlet below the sea." . . . In this neighbourhood occurs the famous Zirknitz lake. . . . "It is about five miles

long, and from one to two miles broad, but usually not more than from six to ten feet deep. Its bottom is said to be perforated with about 400 funnels or pipes through which the water ascends. In wet weather it rises to three times its ordinary height. But even at high water, it is so surrounded with high ground that it cannot find any outlet at the surface, and has to discharge its surplus waters down some of the innumerable caverns in the limestone."

CHAPTER II.

WHAT RIVERS HAVE DONE IN THE PAST.

The sound of streams that swift or slow
Draw down Æonian hills, and sow
The dust of continents to be.

—*Tennyson's In Memoriam*, xxxv.

Rivers as Agents of Erosion.—Hitherto we have considered rivers as they are, as features in the present arrangement of the surface of the globe, without asking ourselves what they may have been or have done in the past. But very little reflection will show that they cannot have acquired their present channels suddenly, and that they must have had a history. We are led to this conclusion by many facts of observation, the significance of which geology has taught us to appreciate. Let us take waterfalls as one of the simplest. Those who have visited these picturesque incidents in the beds of rivers are aware that they usually present the following characteristics. The fall itself, whether of a considerable river or of a small brook, is at the end of a ravine or gorge of varying length, depth, and width. According to the differences in the character of the rock and the force of the stream, we shall have either a narrow, winding, gloomy trench, with nearly upright walls, between which the turbulent water escapes from the swirling pool at the foot of the cascade; or a valley more or less wide and open, with sloping sides of soft material. When we ask ourselves why this is so, we infer that in all cases these ravines, whether wide or narrow, whether in earthy strata or in granite or lava, have been gradually worn out by the force of the stream, and are constantly retreating

backwards.* The brook or river once flowed at the top of the cliff or hill-side, and gradually eat its way down to its present level. But this fact alone points to a long vista of past time. Geologists are all agreed in applying this line of reasoning to Niagara. As is well known, these stupendous falls are not so much remarkable for their height, which is only from 140 to 160 feet, as for the vast volume of water poured over the cliff, calculated at 670,000 tons a minute. It is asserted that the falls were once at Queenstown, where there is a limestone cliff rising above a great plain. Since that distant period they have receded about seven miles to their present site. But the same great law may be observed as well in streams which are comparatively modern. The most recent changes in the surface of a country are produced by landslips, earthquakes or volcanoes. To take the first and most familiar instance, the traveller in Antrim who looks for them will find miniature ravines cut out by tiny brooks in a soft earthy embankment, perhaps only a few centuries old. The so-called Chines in the Isle of Wight are comparatively quite of yesterday. In both these cases recent landslips have changed the face of the country and given the eroding powers of water fresh materials to work on. From a waterfall the transition is easily made to a mountain torrent. In the higher valleys of the Alps the upper courses of the numerous feeders of the Rhine, the Aar, and the Rhone form a continuous rapid. When we give full weight to the headlong speed of the current caused by the slope, to the wonderful volume of water due to melting snow or heavy rains, to the grinding power of the stones and rubble

* Throughout this chapter when rivers are spoken of as agents of erosion, it is assumed that readers do not exclude the help rendered by every shower of rain or snow-storm, and by frost in disintegrating the banks. A river is the result, and the convenient summary of the erosive forces of all the water that gets anyhow into its channel.

carried along by the raging stream, we are prepared for the conclusion, which at first seems startling enough, that the deep gorges at the bottom of which rivers flow in the Alps and similar ranges are mainly due to the eroding action of water. An accidental furrow, or depression, or line of fracture may have determined the course of the first flowing water, but from that commencement the smallest stream has toiled incessantly at the enlarging and deepening of its channel. At the same time it may be well to remember that the present stream has not always been what it now is: in many cases it can be shown to have been once much larger, and there have probably been many epochs of the Tertiary age (with which mainly we have to do) when erosive agencies must have been more powerful than at present. It is obvious that the passing away of a glacial age must have always been accompanied by a tremendous increase in the volume of the rivers. Into these speculative questions we need not enter, but we shall return to the ravines. Many of the Alpine river-gorges have been long known and visited by tourists. One of the most remarkable is that of the Tamina, an impetuous torrent which falls into the Rhine on its left bank in the canton of S. Gall. It has worn a tremendous gorge, the walls of which nearly meet overhead, and into which on the longest day the sun shines only for six hours. One portion of this deep trench is visited for the sake of the hot springs known as Bad Pfäfers.* The river Reuss, again, has for thousands of years been carving out a tremendous waterway through the Central Alps. The deepest ravine in the course of the Rhine is where the celebrated road called the *Via Mala* has been made. Here we have an instructive lesson as to the force of a mountain torrent in flood. In ordinary times the bridge by which the road crosses the river is 250 feet

* This old Celtic name is the same as that of Strath Peffer, the mineral springs now much frequented in the Highlands of Scotland.

above the water, yet in the inundation of 1834 the water rose to within a few feet of the bridge. Who can imagine the force of a column of boiling, maddened water, 240 feet deep, and shut in between walls of rock with so narrow a space between them? In former ages, especially when the retreating glaciers liberated their waters on the amelioration of the climate, such a state of things must have been normal for many years. On giving due weight to these reflections, we see no reason for assigning these chasms to "convulsions of nature," but can ascribe them confidently to erosion. On a smaller scale similar trenches cut in rock are found in our own island in the course of the Wharfe and of Hell Gill Beck, to select two undoubted examples. Of the formation of valleys by erosion we find some very recent instances in volcanic countries. The Simeto which runs down the slopes of Etna was stopped up by an eruption in 1603, but has by this time cut out a channel about 60 feet wide and 70 feet deep. In the district of the Auvergne volcanoes, most of which have been extinct apparently through all historical times, we have wonderful examples of the same kind. Dr. A. Geikie in an account of his visit to Auvergne in 1861 (Galton's *Vacation Tourists in 1861*, p. 217), dwells particularly upon this point. "Nothing," he says, "I had seen or read had prepared me for such a stupendous manifestation of the power of rains and rivers. . . . Looking down into the valley of Villar (near Clermont)—a deep gorge, excavated by a rivulet through a lava current, and partially choked up by a later coulée of lava which the stream is now wearing away—I received a kind of new revelation. . . . Since the eruption of the basalt, therefore, the whole of this gorge has been excavated. . . . It is with a feeling almost of reluctance that we are compelled to admit, in default of any other possible explanation, that the erosion of the valley has been the work of the stream, that seems to run in a mere rut at the end of the slopes."

Again, he gives the following valuable account of the country immediately around the town, Le Puy (p. 244)—“Le Puy lies in the centre of what, during a part of the tertiary periods, was a lake, some twenty miles long, and twelve or fourteen broad. This lake occupied a hollow in the great granite framework of the country, and like the Limagne d’Auvergne, gave rise to the slow accumulation of fine marls, limestones, and sandstones, which attained a united thickness of hundreds of feet. Over the top of these horizontal strata, the lavas and ashes were erupted to a depth of three or four hundred feet more, so as wholly to cover up the lacustrine deposits, and obliterate the site of the lake. Since these events, the Loire and its tributaries have been ceaselessly at work in deepening and widening their channels. And now, incredible as it may seem, these streams have actually cut their way down through the solid basalt, and a great part of the old lake formations. They have, in short, excavated a series of valleys, several hundred feet deep, and sometimes of considerable width, along the sides of which are exposed the remaining edges of the strata that have been borne away. Standing on the summit of the Mont Denize, and looking round upon the valleys and ravines on every side, each traversed by what seemed such a tiny stream, I felt as if a new geological agent were for the first time made known to me. . . . To be actually realised such a scene must be visited in person. . . . It is not without an effort, and after having analysed it, feature by feature, that one who is acquainted only with the rivers of a glaciated country such as Britain can take it all in. But when he has done so, his views of the effects of subaerial disintegration become permanently altered, and he quits the district with a rooted conviction that there is almost no amount of waste and erosion of the solid framework of our islands and continents, which may not be brought about, in time, by the combined influence of springs, frost, rain, and rivers.” Similar

phenomena may be seen in the Rhenish district of the Eifel. The Brohl-thal, which falls into the Rhine near Andernach, may be mentioned as a very delightful and accessible example of a depression between primitive slate hills, which has been first of all filled up by soft tufa-like rock ejected from the volcanic vents around the Laacher See, and afterwards excavated by the small river called the Brohl.

But instructive as these instances are, they are dwarfed in scale by the colossal effects of erosion in the higher districts of the Rocky Mountains. The cañons or gorges of the Colorado and its affluents flowing westward into the Pacific, of the Arkansas, North and South Platte, and Canadian running eastward into the Missouri, beggar all description. Let us take the eastern slope first, and consult the admirable records of the official United States Geological Survey (Colorado, 1874). According to the accomplished geologists who conducted that laborious task under Professor Hayden, the country of the Upper Arkansas was originally a vast plateau or *mesa*, as the Spanish discoverers first called it, made up of strata chiefly of soft sandstone, almost horizontal, but with a slight dip to the east. In this table-land the streams have cut a complicated maze of deep trenches or ravines, the larger rivers for longer distances, the smaller for shorter. Where the rocky sides are almost vertical, and the ravine very narrow, the Spaniards applied to them the expressive word cañon, pipe, or tube. Even the smallest brooks in such districts trench the soil deeply, and in many places the ridge dividing two small cañons is worn down to a knife-edge, or gradually crumbles away. The consequence of the fact that the fertilizing water flows so far below the surface is a scene of desolation and ruggedness almost inconceivable. Professor Hayden remarks—"It is in the study of these gorges that the geologist learns to appreciate the immense results of erosion in giving form

to the rocky range of the West. Even yet the power of this force has not been adequately understood, but the wider our range of observation, the greater is our conception of its power. I find it difficult to estimate the extent of the erosion in this region, and can only speak of it in general terms as almost inconceivable to a finite mind."

Similarly, Mr. Holmes gives a most graphic description of the way in which a plateau is attacked by running water, illustrated by a marvellously accurate illustration (Plate XLI., Colorado vol., Report for year 1874.) He is speaking of the Mesa Verde (green table) made up of massive beds of sandstone, and one "of the grand features of the great Colorado Plateau":—"This floor, although unusually firm, seems to be yielding very rapidly to the eroding forces. Many side-cañons are eating their way into the very centre of the mass, and large fragments have already been entirely or partially severed. These fragments or outliers are always interesting and picturesque objects, and may here be seen in all stages of formation and decay. Some still retain their table-like caps, and are a number of square miles in area; others stand as majestic columns, whose vertical sides are fantastically carved and coloured; others are so far reduced that they are mere needles that totter over their slender bases, while innumerable piles and heaps of earth mark the sites of those from which the capitals and columns have long since fallen." No where else on the globe does Nature present such magnificent, such stupendous examples of the action of running water. Of the innumerable cañons that occur in Arizona, Utah, Colorado, Wyoming, and Montana, some are so remarkable as to deserve individual mention. The greatest of all is that of the Colorado of the North, in South-East Nevada, Utah, and Arizona; this is about 300 miles long, and varies in depth from 3,000 to 6,000 feet. Its walls are nearly vertical, and exhibit in succession limestone, palæozoic rocks, and even the granite which underlies them. All its tributaries for this

distance—the Virgin, Kanab, Paria, Escalante, Dirty Devil, on the right; Green River, Yampa, San Juan, and Colorado Chiquito, on the left, have also deep narrow winding cañons; each of their tributaries in turn down to the smallest brooks have dug out their own trenches. The whole district is a labyrinth of water-courses below, and above a sandstone desert more hopeless than the Sahara. But how impossible to realise a river gorge a mile deep (5,280 feet) in which, in other words, a tower as high as Ben Nevis (4,406 feet) would disappear! Compared to the colossal precipices and gulfs to be found in this terrible wilderness, the *Via Mala* and the Tamina ravine are trifles. But there are other great cañons which are more accessible to man. Some are even attractive, as the cañon of the Yellowstone, in the Yellowstone Park. According to Professor Hayden, this is only 1,200 or 1,500 feet deep, but no language can do justice to its wonderful beauty and grandeur. The nearly vertical sides of the cañon are variegated with yellow, red, brown, and white, all mingling and passing into each other. This rich and wonderful brilliancy of tint is ascribed by the Professor to the percolation of hot water from the springs, and consequent chemical changes. Again, the Denver and Rio Grande Railway, in its branch line to Leadville, has actually been carried along a cañon formed by the river Arkansas. The walls of the gorge are about 3,000 feet high, and for several miles there is just room for the railway and the river, and for a few yards the line has to be carried over the stream.

But we are not now concerned so much with the extraordinary and gigantic features of the Rocky Mountain scenery as with its value as a lesson in erosion. The mind is baffled at the attempt to calculate the time taken by these rivers in wearing out such profound beds, and this time, immeasurable as it seems, must begin subsequent to the deposit of the top-most layer of sandstone. For no one can doubt that the rivers once flowed along the top of the nearly horizontal

plateau which they have gashed so deeply. It is only natural that erosion should now be looked upon as the great sculptor of the land, the term being extended to include the work of snow and ice. Such is the present drift of scientific opinion. Following the suggestion of the North American cañons, Professor Ramsay has applied it to explain the scenery of Wales. He tells us that between the Vale of Towey and Cardigan Bay the flat-topped hills show a remarkable uniformity of height; that they are probably the relics of a vast table-land, now intersected by numerous rivers which in the long lapse of untold ages have scooped out the valleys. "In various parts of Europe, notably in those regions that have been longest above the water—on the banks of the Moselle and of the Rhine, and in the great coal-field west of the Appalachian chain in North America—we find unnumbered valleys intersecting table-lands of a form that leads us to believe that they also have been made by the long-continued action of atmospheric waste and running waters."—(*Physical Geology of Great Britain*, p. 498.) Similarly Professor Geikie sees no difficulty in conceiving Scandinavia as a former table-land, so worn down by valleys as to retain its original shape only in the central highlands. Réclus, again, does not shrink from inferring from the regularity of arrangement of the Pyrenees, that they form an enormous ridge of elevation (*un énorme bourrelet de soulèvement*) thrown up like a rampart from sea to sea, and afterwards carved by running water into valleys and passes and peaks.—(Introduction to Joanne's *Pyrénées*.)

Rivers as Agents of Transport and Deposit.—We have seen already that rivers must waste and carry off an enormous amount of the dry land in the act of cutting out their beds. Now, what becomes of all this soil, and of the mud brought down into the stream by every rill which flows into it? It is transported to distances varying with circumstances, and sooner or later redeposited. A flooded mountain-stream, turbid

with mud, and rolling gravel and stones along its bed, can carry heavy materials as long as its slope is great, and lighter silt after the slope is almost imperceptible. Deposition takes place when the current is checked as by entering a lake, by reaching level land, or by falling into the sea. The soil thus laid down by streams is easily recognised, and has been long known as alluvial. Rivers in this way repair in one place the waste which they have caused in another. The ancient Greeks were so much struck by the character of the soil of Egypt as to leap at once to the conclusion of modern geology, that the Delta was the "Gift of the Nile" (*Herod*, ii. 5). They were the first to give the name Delta to the land formed at the mouth of a great stream by the branches into which it divides from the triangular shape of the Greek letter so called. Such a formation is especially frequent in the Mediterranean and its inlets, owing to the comparative absence of tides. A simpler case still is when a river falls into a lake, and most people have seen the spit of sand or gravel advancing into the water which a rivulet forms under such circumstances. Precisely what takes place in the smallest Welsh or Scotch or Cumbrian tarn, takes place where the Volga enters the Caspian, or the Mississippi the Gulf of Mexico. The Lake of Geneva is a good example of this formation. The river Rhone rushes into it loaded with the waste of the Alpine rocks. A track of alluvial land about eight miles long has been formed by it at the upper end of the lake. Port Valais was once at the water's edge, but is now after 800 years a mile and a-half inland. Besides the Rhone, more than forty streams, including the Dranse and the Venoge, carry into the lake the waste of the surrounding hills. The result will inevitably be ultimately to fill up the lake, although so deep a cavity will require a vast period of time. In the same way the Rhine is at work in the Lake of Constance. That such has been the fate of many lakes in the past is evident to the trained eye of the geologist who can point out many a fertile flat, which from

its organic remains must long ago have been a lake. The Limagne, in Auvergne, is an instance where the deposited strata abound in the remains of fresh-water shells. In many parts of the Mediterranean the rivers have added very rapidly to the coast by their deposits. Venice is built on soil which the Brenta, the Piave, and the Adige have swept down from the mountains. Lower down the gulf the combined action of the currents and of the Po has changed the coast so much near Ravenna that it is almost impossible to make out its condition when it was an important naval station of the Roman Empire. In those times it was still accessible to ships by means of a series of lagunes and channels, but as they have since been filled up, "it now stands at a distance of four miles from the sea, from which it is separated by a broad sandy tract, covered in great part with a beautiful forest of stone pines."—(E. H. Bunbury, in *Smith's Geographical Dictionary*). The silting up of Augustus' harbour had taken place as early as the 5th century. Along the coast of Asia Minor, once so animated a scene of enterprise and commercial activity on the part of the Greek colonists, it is almost the rule for the old ports to be now filled up. Thus, small as is the river Cayster, through its efforts the ruins of Ephesus are now a mile inland. Similarly the towns of Priene and Miletus are now separated from the sea; Myus and Heraclea, once on the Gulf of Latmus, are now on the shores of an inland lake; the port of Smyrna is in danger of silting up at this present moment. This excessive rate of deposit, however, is with great plausibility partly assigned to the wasteful destruction of forests on the mountains, in consequence of which the rains give rise to formidable torrents, which sweep away the soil from the heights, change plains into marshes, and block up the ports.

If such considerable changes have been effected by rivers in the comparatively short period of two thousand years, we shall not be surprised to find traces of more gigantic labours

during the far-reaching vistas of geological time. The area of the delta of the Mississippi is given as 40,000 square miles, that of the combined Ganges and Brahmapootra as about 50,000; in both these cases a vast amount of sediment had to be used first of all to fill up the deep sea before any land-surface could appear above water. As is well known, the Netherlands, so interesting to all lovers of freedom, are the combined result of the deltas of the Rhine, Meuse, and Scheldt. But the great rivers have done much more than make deltas. Dr. Geikie does not hesitate to say that much of the vast plains of Bengal has been brought down by the Ganges and Brahmapootra; that the Tigris and Euphrates have filled up the upper half of the valley of which the Persian Gulf is the still remaining lower half; and that most of the eastern coast-line of the United States has been formed of alluvial soil washed off the land—(*Physical Geography*, p. 297).

Why has the Thames, the Amazon, the Rio de la Plata no delta? It is not very easy to assign a satisfactory reason. Probably the effect is the result of many co-operating factors. Apparently the currents of the North Sea and the tidal scour are sufficient to prevent the chief of our English rivers from forming land at its mouth. The existence of the strong oceanic current running in a north-westerly direction past the coast of South America is usually credited with a similar function with regard to the Amazon; in this case much of its enormous burden of silt must be redeposited along the coasts of Guiana which are purely alluvial. In our own island, besides a narrow edge of alluvial soil near most rivers, we have an important alluvial district in Lincolnshire and the part of Yorkshire known as Holderness.

Antiquity of Rivers.—While it is impossible to solve the question of the age of rivers, a consideration of the facts adduced above will prove their great antiquity compared with the historical or human period. We can hardly form any

notion of the number of years required to deposit the Ganges Delta after first filling up the Bay of Bengal to the level of the surface of the sea. Equally baffling is any estimate of the time required for the erosion of the marvellous system of cañons in North America. Some slight diminution of the period may perhaps be obtained by remembering that, in all probability, the rivers of Europe and North America were, in a recent period of geological time, much larger than they now are.

The Glacial Epoch, or Great Ice Age, is a landmark to a certain extent in the immediate past. It is the opinion of the British Geological school that most of our river-valleys are older than the period of glaciation in Scotland and Ireland, and have re-emerged at its end with modifications. One thing at any rate is pretty certain, and that is, no rivers can be older than the earliest upheaval of the mountain-system which determines their slope. Thus, the Rhine, Rhone, and Danube cannot well date before the elevation of what are now the Alps. To return, however, from such barren generalities, we may give in conclusion another mark of the antiquity of river-valleys—the occurrence of terraces along their sides. These are observed on a stupendous scale in the valleys of the Thomson and Fraser rivers in North America. Lord Milton and Dr. Cheadle thus describe them in their fascinating book (*North-West Passage by Land*, p. 332—small edition):—"On the Fraser they stretch from a little north of Alexandria to the cañons above Yale, a distance of above 300 miles. These terraces—or benches, as they are called in this district, are perfectly level, and of exactly the same height on each side of the river. . . . In most places there are three tiers, each tier corresponding with a similar one on the opposite side of the valley. The lowest of the three, where the valley expands, presents a perfectly flat surface of often many miles in extent, raised some forty or fifty feet above the level of the river bank, with a sloping front resembling the face of a rail-

way embankment. Higher still, the second tier is generally cut out of the mountain side, seldom more than a few acres in extent, and raised 60 or 70 feet above the lower one; while marked at an inaccessible height along the face of the bluffs which run down to the river, and probably 400 or 500 feet above it, is the third tier. These 'benches' are quite uniform, and of even surface." Whatever be the correct explanation of these phenomena, at any rate they undoubtedly point to a long lapse of time.

On a smaller scale such river-terraces are found in the British Isles. Thus, Professor Hull (*Physical Geology and Geography of Ireland*) describes them as occurring in the river-valleys of Wicklow, as for example at the lower end of the vale of Glenmalure, above the junction of the rivers Avonbeg and Avonmore. They are also conspicuous along the river Boyne. The Professor says of them (p. 114)—"Where sections are exposed, it will be found that, like the alluvial flats themselves, the terraces are composed of river gravels, generally overlaid by a thin stratum of silt; and we therefore infer that they are themselves old alluvial flats which were once occupied by the waters of the river, but which are now forsaken, the stream having deepened its channel. Sometimes two or more of these terraces may be observed, indicating successive deepenings."

Apparent anomaly in River-courses.—There is one singular and puzzling feature in the history of river-courses, which has struck all observers. It is that the streams often do not take what now appears the easiest and most direct course to the sea, but on the contrary go quite out of their way in search of mountain barriers. Thus, the Avon at Bristol escapes to the Severn through a long and deep gorge cut in carboniferous limestone, which could have been avoided by a circuitous route, as we should imagine; the Welsh Wye similarly makes its way through a bold escarpment of old red sandstone. Professor Hull tells us precisely the same

story about the Shannon. That noble river, after flowing sluggishly through a nearly level limestone plain, cuts a gorge right across a dome-shaped mountain consisting of a cone of silurian grits and slates with old red sandstone on their flanks. So, again, the Rhine, after flowing through a plain from Worms to Mayence, cuts a deep valley through the range of the Taunus which lies right across it. The Danube, again, after traversing the immense plains of Hungary, cuts a trench through the Carpathian mountains by the famous Iron Gate. How is this to be explained? The older fashion among geologists was to invent for the occasion a "convulsion of nature," and to suppose that the hills were thus abruptly fissured, and the rivers took advantage of the gap. The fissure was sometimes attributed to the force of a dammed up lake. The lake theory is evidently insufficient, for surely the waters could have found a natural outlet somewhere at a lower level. And why should that outlet have always been a continuation of the general direction of the original river-course? Again, so enormous a lake would have left lacustrine deposits, which are said to be always absent. Ramsay, Geikie, Hull, etc., consider that these gorges are too obviously gorges of erosion to have been produced any other way than by erosion, that is, by the river flowing originally at the top of the table-land so trenched. *And it reached that table-land by flowing along high ground behind it, which has since entirely disappeared through denudation.* Thus, the key to the puzzle is the fact that there have been tremendous physical changes since the river first chose its path. As Professor Hull well puts it—"If the mountains had been where they are, at the time the river began to flow, it would not have selected that course on its way to the ocean. Water must flow down hill, and, therefore, when we find a river flowing across a ridge through which it has cut a channel for itself, we must assume that before the channel was cut, the ridge did not exist as such, i.e., relatively to the district through which the river flows.

We therefore conclude that when the Shannon selected its channel *the ridge of mountains through which it passes was somewhat lower* than the plain to the north. . . . At this time the plain to the north was overspread by coal-measures, and was relatively higher than the Slieve Bernagh and Slieve Arra ridge, at that time united. . . . Meanwhile, the river, having once selected its channel, never abandoned it; but as the land to the north became lowered (through denudation) the channel was deepened by the action of the somewhat impetuous current, till ultimately the original ridge was dissevered into two masses, and the existing gorge of the Shannon above the city of Limerick was hollowed out." (*Physical Geology of Ireland*, p. 174.) The same process of reasoning with requisite modifications will explain the course of the Rhine, Avon of Bristol and Herefordshire Wye.

With reference to the last-named, Professor Ramsay supposes that the Old Red Sandstone, now ending abruptly in the escarpment of the Breconshire Beacons and Caermarthenshire Vans, once spread much further westward (*Phys. Geol. of Great Britain*, p. 500), and that, consequently, the river ran over ground now vanished, perhaps higher than the tops of the hills of the present escarpment, and by degrees cut itself a channel. To those unaccustomed to geological reasoning this explanation may appear forced, but only to them. No one, ever so little acquainted with the modern tendencies of that science, can fail to realise what feats denudation is capable of accomplishing. Modern geologists feel no difficulty in believing that the great central plain of Ireland has been stripped of the coal-measures that once covered it. Two reasons are enough for them—first, that it consists of Carboniferous Limestone, the rock which forms elsewhere the lowest member of the regular series of the Palæozoic coal-measures, and secondly, because fragments of the coal-measures actually exist where they have been locally protected from waste. But the mind fails to

grasp the length of time required for this process. According to Professor Hull it covered the whole period required for the deposition of the Permian, Triassic, Liassic, and Oolitic beds, the Chalk Age, and the vast epoch known as Tertiary. "Throughout this inconceivably prolonged lapse of time, our island (*i.e.*, Ireland) was more or less unsubmerged, its surface being swept by subaerial waters (*i.e.*, rain and snow and rivers), and its strata carried little by little into the adjoining ocean, to form perhaps some of the strata which were being piled up over the ocean-bed of the British area." But during all this period the Shannon has flowed where it now flows. This one example shows us what fresh and strange interest is thrown over our familiar streams by an attempt to trace out their geological history.

CHAPTER III.

THE SCENERY OF RIVERS.

The current, that with gentle murmur glides,
Thou know'st, being stopped, impatiently doth rage;
But when his fair course is not hindered,
He makes sweet music with the enamelled stones,
Giving a gentle kiss to every sedge
He overtaketh in his pilgrimage;
And so by many winding nooks he strays,
With willing sport, to the wild ocean.
—*Shakespeare, Two Gentlemen of Verona.*

Yon eddying balls of foam—these arrowy gleams,
That o'er the pavement of the surging streams
Welter and flash.
—*Wordsworth.*

Still glides the stream, and shall not cease to glide;
The form remains, the function never dies.
—*Wordsworth.*

THE mountains and the sea are the two grandest elements in scenery, and a great river links them together. If we explore any of the larger streams of the world, we begin our pilgrimage within the hearing of the salt waves, and end it amid the precipices and snows of an Alpine landscape. River scenery has a peculiar charm in each of its stages, though its varying phases may appeal with different force to different individuals. Some are most delighted by the foaming torrent, others by the “full-fed river winding slow” through a plain, others by the breezy flats where fresh water and tidal mingle. It will be interesting to trace out in detail the features of River

Scenery which have in successive ages awakened the sense of beauty.

The Mountain Course.—It is a commonplace to say that the love of Alpine scenery is of modern date. Would it not be more true to say that it has always existed, but has only found adequate expression in recent times? That primitive men have from the earliest ages been alive to such impressions seems shown by the wide-spread custom of considering mountain-peaks as sacred. Why did the early Greek settlers believe the snowy top of Olympus and the steep cliff of Parnassus to be the haunts of their gods, if they had no sense of the mystery and awfulness of mountains, of the region where the glowing rocks catch the earliest and latest sunbeams, where the pure air and the solemn solitude raise men into a nobler moral atmosphere above the gross vapours and turmoil of the plain, and where, too, the wintry blast has its terrors as it drives the blinding snow around the barren scours? Of this mountain world the brook is an inseparable part. In summer its tinkling cascades blend with the murmur of the pines and the lowing of the cattle in the high pastures, in winter its angry roar is in harmony with the howling storms. How admirably does Wordsworth reproduce this early stage of a stream in his *Duddon Sonnets*!

Child of the clouds! remote from every taint
Of sordid industry thy lot is cast;
Thine are the honours of the lofty waste;
Not seldom, when with heat the valleys faint,
Thy hand-maid frost with spangled tissue quaint
Thy cradle decks —

(Sonnet ii.)

And again:

— thou appear'st a glistening snake,
Silent, and to the gazer's eye untrue,
Thridding with sinuous lapse the rushes, through
Dwarf willows gliding, and by ferny brake.
Starts from a dizzy steep the undaunted rill
Robed instantly in garb of snow-white foam.

(Sonnet iv.)

Wordsworth, like all true lovers of nature, was aware that absolute height is of little importance as an element of sublimity. No mistake could be greater than that of estimating the grandeur of mountain-ranges according to their altitude as expressed in thousands of feet. A range like the Riesengebirge, the highest point of which, the Schneekoppe, is nearly 5000 feet above the sea, is tameness itself compared with Snowdon or Helvellyn, which fail to reach even 4000 feet. Still, it must be confessed that above the height of 5000 or 6000 feet in the Temperate Zone, we are on the threshold of a new world—a world of silence and desolation. We then reach valleys which are smothered for a great part of the year in snow. Their sides are precipices of bare rock; the stream that raves at their feet is a continuous rapid, broken by occasional leaps of tremendous height. Deep and gloomy ravines appear on each side; the silence is almost unbroken; the animal world is confined to a few insects, the vegetable to a few brilliant flowers, which give way at last to hardier mosses and the long-enduring lichen. In this region we expect the highest waterfalls. As far as our present knowledge goes, the pre-eminence in the list must be given to the Yo-semité in the Sierra Nevada of California. The Yo-semité brook (so called by the Indians from the *grizzly bear*) is one among many others which abruptly leap into a wonderful valley about six miles long by one and a-half broad, which lies nearly a mile in perpendicular depth below the general level of the adjacent country. This marvellous chasm Baron Hübner (*Ramble Round the World*, chap. xi.) considers like the Aussee in Styria, "only seen through a magnifying glass. . . . It is the same crystal water, the same contrast between the smiling vegetation of the valley, and the severe nakedness of the rocks which surmount it. Only here everything is colossal. . . . The huge rocks rise all in one piece from the depths of the gorge up to the sky." The Yo-semité first shoots in a single bound for 1,500 feet, when it

strikes a shelf or recess ; then there follows a series of cascades for a distance of 626 feet, and then the final plunge of 400 feet ; altogether it falls for the stupendous height of 2,526 feet. No higher fall is yet known, though one may possibly exist in the unexplored recesses of the Andes or Himalayas. It is right, however, to add that the Yo-semité shrinks very much in the dry season. Among the other streams that leap down this enormous wall of rock is the Bridal Veil with a total height of 930 feet, the Virgin's Tears with a height of 1000 feet, and the Nevada with one of 600 feet. In harmony with the gigantic scale of the natural features of this rift in the Sierra is the fact that the world-famous groves of Mariposa are at no great distance, where the *Sequoia Gigantea* (the Wellingtonia of our nurseries) has survived, as it were, to represent to us the vanished forests of the Miocene epochs. In Europe one of the highest falls is that of Gavarnie in the Pyrenees. The cascades are here a mere accessory to a much grander feature—the celebrated *cirque*. This is a rocky amphitheatre which forms the abrupt termination of a wild chaotic valley encumbered by the huge boulders which have fallen from the Piméné. The circuit of this vast round is a mile and 380 yards, its height is 1,300 feet : its perpendicular walls are divided into three main stages with many smaller steps. From the snows above threads of water in scores trickle down the face of the cliff, but only two of the streams are permanent. The cascade is broken by a projecting ledge of rock, and ends in a cloud of fine spray. On arriving at the bottom of the terrible gulf the streams form a rapid torrent (the Gave de Pau) which runs for some time under a bridge of snow varying in length according to the season, but scarcely ever absent. "These waters," says Mons. de Chausenque, (*Les Pyrénées*, Agen. 1854), "which seem to fall from the clouds, form at first only a wide-spreading sheet. The resistance of the atmosphere divides it into a vapour which the least breeze drifts afar ; a watery haze floats in the air. . . . If the

cascade is beautiful, even under an August sun, when the glaciers are the most reduced in size, how majestic and terrible must it be in spring, when the warm wind (*vent d'Espagne*) breathes upon the accumulated snows, and the waters rapidly melting rush headlong from the rocks, which they drag with them, flinging themselves at last from the top of these precipices in an enormous mass which shakes the mountain to its very foundations. This is the right time to see it; the ledge of rock which intercepts the fall has disappeared; in its height of more than 1,300 feet it is but one broad smooth unbroken sheet, and all the threads which drape the circuit of the amphitheatre are changed into imposing cascades. It is as if all the waterspouts of heaven had burst at once." Other wonderful falls in the Central Pyrenees are the *Cascade de l'Enfer* and the *Cascade du Gouffre Infernal*—both near Bagnères-de-Luchon.

In the Alps there are innumerable cascades, some of great celebrity. The *Staub-bach*, or Dust-brook, is a small stream near Lauterbrunnen, which pours over the top of a precipice from a height of 850 feet. As its name indicates, it is little more than a cloud of spray. The *Giess-bach*, in the same canton, is a fall of greater beauty, or rather a succession of foaming cascades, with all the natural surroundings of rock and wood that could be desired. One of the noblest falls in the Alps is comparatively little known—that of the *Tosa* in the Formazza valley on the Italian slope. Its height may not be more than 500 feet, but the length of the broken water is fully 1000. It is distinguished by the fan-like way in which the water spreads out through its numerous stages, and by its volume. In Norway, again, wherever the high table-land of the interior sinks abruptly into the heads of the fiords there must be waterfalls. *Rjukan-foss*, or Smoke-fall, in Thelmarken, is one of the finest, where the *Maan Elv* suddenly clears 500 feet at a bound at the head of the Vest Fiord. A local colouring is lent to it by the deep solemn inlet, with its rocky walls and

gloomy pinewoods reflected in the still and waveless sea-water below.

As Lord Byron remarked long ago, two of the most charming falls in the world are artificial—that of the Velino at Terni, and that of the Teverone at Tivoli. These happen to be the only two streams by which the waters of the western slopes of the Sabine Hills can escape to the sea. But these rivers deposit so much travertine along their bottom as seriously to fill up their beds, and thus give occasion to fearful inundations. For this reason an artificial cut was made for the Velino, which caused it to fall over a cliff of 460 feet into the valley of the Nera (the ancient Nar), with a mass of water far superior to that of any Alpine cascade. We shall recur to this waterfall presently.

Middle Course.—When we leave the Alpine stage of a large river, we enter upon a region where human industry comes into play. The roaring torrent has been of little use to man. It has served the solitary shepherd as a watering-place for his flock; in suitable places it has floated down logs of timber cut in the high slopes, or it has turned the wheel of the corn-mill or saw-mill. But on arriving in the lower country the scene changes. The sloping hills widen into valleys rich with corn, or orchards, or vineyards; on each side of the river spread green meadows full of pasturing cattle. On the smooth waters the fishing boats, the barge or the steamer reminds us that the *moving highway*, the *chemin qui marche* has begun. Here and there we have busy towns which have been the seats of commerce, or art, or government for centuries; we have stately minsters, and massive bridges, and frowning fortresses. Ever and anon an affluent brings its tributary wave. Of the peaceful beauty of this stage all are conscious. Nor is it altogether devoid of bolder features. As has been already mentioned in chapter ii., the river sometimes cuts its way through an opposing range of hills in a manner that adds very much to the picturesqueness of the scenery. Such

is the valley of the Rhine, between Bonn and Mayence, where

The river nobly foams and flows—
The charm of this enchanted ground.

The breadth and volume of the stream, its smooth and rapid current, the numerous castles which crown the rocky hills which border it, the associations of history and fable throw a spell around the Rhine which few can shake off. In natural beauty the Wye, between Monmouth and Chepstow, and the Dart, below Totnes, are superior, but both the English rivers lack the sense of space and freedom as well as the length of course of the German stream. The scenery of the lower Danube, as it escapes from the vast plains of Hungary through the Iron Gate in the Carpathians is also very noble, but deficient in human interest. It is in the middle course of a river that its largest, though not its highest falls occur. The chief cascade of the Rhine is at Schaffhausen, where its volume and force are very great. The Niagara occurs in the sluice connecting two enormous lakes, but one may be excused from repeating its familiar details for the thousandth time. It is possible that when we know more of the Victoria Falls on the Zambesi they may have to claim precedence over the boast of America. The country where they occur is an extensive table-land from 3000 to 4000 feet above the sea, with an outer fringe of basaltic rock. A transverse gash or fissure in this basalt about 400 feet deep crosses the bed of the Zambesi nearly at right angles; and it is into this narrow cleft that the mighty river plunges, where more than a mile broad. There are three falls separated by islands; the first or western is 100 feet wide, and the other two are each about half-a-mile wide. The columns of vapour are said to mount to a height of 800 feet, from which circumstance the natives have given it the expressive name of *Mosiotunga*, or *smoke sounds there*. After its fall the river escapes in a deep narrow trench which it has excavated for 30 miles in the basalt.

Major Serpa Pinto, in his recent book, *How I Crossed Africa*, vol. ii., p. 158, gives his impression of this wonderful cataract. After estimating the height of the smallest of the three falls as 262 feet, he proceeds: "This is the smallest of the falls, but it is the most beautiful, or, more correctly speaking, the only one that is really beautiful, for all else at Mozi-oa-tunia is sublimely horrible. That enormous gulph, black as is the basalt which forms it, dark and dense as is the cloud which enwraps it, would have been chosen, if known in biblical times, as an image of the infernal regions, a hell of water and darkness, more terrible perhaps than the hell of fire and light. As if to increase the sensation of horror which is experienced in presence of this prodigy of nature, one must risk one's life in order to survey it. At times, when peering into the depths, through that eternal mist, one may perceive a mass of confused shapes, like unto vast and frightful ruins. These are peaks of rocks of enormous height, on to which the water dashes and becomes at once converted into a cloud of spray, which rolls and tumbles about the peaks where it was formed, and will continue so to do as long as the waterfalls and the rocks are there to receive it." Where the currents from the three falls meets, he adds—"the result is a frightful seething whirlpool, whence the creamy waters rush, after the mad conflict, into the narrow rocky channel before alluded to, and go hissing away through the capricious zig-zag chasm. . . . Never-ending showers of spray descend upon all objects in the proximity of the falls, and a ceaseless thunder growls within the abyss. Mozi-oa-tunia cannot be properly either depicted or described. The pencil and the pen are alike at fault, and in fact, saving at its western extremity, the whole is enveloped in a cloud of vapour, which, perhaps fortunately, hides half the awfulness of the scene."

Lower Course.—To many the final stage of a river is the least interesting where it loses its way in a dreary marsh-land, or splits into four or five lazy arms; when, however, it

gradually widens into an estuary, as in the case of the Thames, the Mersey or the Clyde, we have one of the noblest sights in the world—a broad bosom of waters crowded with the shipping of every nation. Even the marsh-lands have a strange individuality of their own, where the throb of the world-wide sea is felt in many an inland nook and corner of our maritime counties. The smallest brook which falls into the estuary acquires a dignity of its own; it is changed into a navigable channel twice in every twenty-four hours by the intruding tide. Muddy though the creek may be, it has the fresh salt breath of the ocean, it whispers mysterious suggestions of the vast horizon beyond the quiet parish bounds of adventure and commerce and battle on the deep blue water. The lower course of the gigantic Amazon offers to travellers a phenomenon rare in rivers—what has been called a water-horizon, that is, when the sky in one or more directions seems to rest upon water as at sea. This was observed by Avé-Lallemant on his voyage up the river, as occurring frequently as far from the sea as Tabatinga, opposite the mouth of the Javari, about 2,000 miles from the Atlantic. When seen in several directions at once, a water-horizon must add very much to the impression of vastness made by the Amazon. At the same time it must be remembered that a water-horizon does not imply any great distance from the spectator; from the deck of an ordinary river-steamer it would be about seven or eight miles off. It is clear that, owing to the low shores of the Amazon, any straight reach of that stream would present the phenomenon in the direction of its length, if it only extended to about ten miles. It is, for instance, to be seen on Loch Ness ahead or astern of the steamer's track, while the mountains shut in the view on both sides.

Waterfalls as treated by Poets.—When we consider what beautiful and striking features in the course of a river waterfalls are, we are amazed at the very slight notice taken of them by the poets of the ancient world. In the Hebrew

Scriptures we seem to have only one allusion to them in Micah i. 4,—“As the waters that are poured down a steep place,” or, as the margin has it, “a descent.” In Greek literature, Homer does not seem to have caught, like Tennyson, the picturesque aspect of

The long brook falling through the cloven ravine,
In cataract after cataract to the sea.

He does indeed allude to the high and gloomy fall of the Styx in the Arcadian Alps,* but chiefly as an object of superstitious dread. Mountain torrents he often describes, but usually with some reference to their roar in flood or their desolating power. Thus, in the 13th book of the *Iliad*, the undermining of a huge rock by a stream is forcibly brought in :—

Like some huge boulder with destruction fraught,
That from the summit of a monstrous cliff
Comes thundering down, what time impetuous rain
And wintry torrent have the fastenings loosed
That held it to the rock : aloft it bounds,
While crash the woods beneath, and still it flies—
Its course unchecked, until it reach the plain ;
And there, although impatient, rolls no more.†

— *Wright's Translation.*

Again, he compares the meeting of the two hostile armies to that of two swollen torrents :—

And e'en as wintry streams,
Rushing down mountains from vast reservoirs
Through deep ravines, mingle in hollow chasm

* Described more fully in chapter vi.

† ὁλοοίτροχος ὡς ἀπὸ πέτρης,
ὄντε κατὰ στιφάνης ποταμὸς χειμάρροος ὡση,
ρήξας ἀσπέτῳ ὄμβρῳ ἀναιδέος ἔχματα πέτρης
ὑψι δ' ἀναθρόσκων πέτεται, κτυπέει δέ θ' ὑπ' αὐτοῦ
ῥλῃ· ὁ δ' ἀσφαλῆως θέει ἔμπεδον, εἶος ἵκηται
ισόπεδον, τότε δ' οὔτι κυλίνδεται ἐσσύμενός περ.

— *Iliad*, xiii. 137-142.

Their mighty waters ; and the war is heard
By listening shepherd on the distant hills.*

—Wright.

But we hardly meet with any distinct recognition of the beauty of a cascade till the time of Theocritus. He writes, for instance,

Shepherd, thy lay is as the noise of streams,
That plainward fall and fall from yon high hill.†

—Calverley's Translation.

And again—

There we lay
On mats of fragrant mastic withies stretched
Luxurious, and on fresh-heaped leaves of vine ;
Thick overhead the elms and poplars shook ;
Hard by a sacred spring in tinkling fall
Flowed from the Nymphs' own grot.‡

—Calverley, altered.

In Latin literature there is the same absence of any artistic treatment of waterfalls, although the wealthy Romans loved to hear the plash of a fountain leaping in their cool marble courts or in their immense parks. Ovid is perhaps the first who gives a distinct picture of a cascade in the following lines:—

There is a glen Thessalian, girt about
With woods and beetling crags—men call it Tempe :

* ὥς δ' ὅτε χεῖμαρροι ποταμοὶ κατ' ὄρεσφι ρέοντες
ἐς μισγάγκειαν συμβάλλετον ὄβριμον ὕδωρ
κρουνῶν ἐκ μεγάλων, κοίλης ἔντροσθε χαράδρης·
τῶν δέ τε τηλόσε δούπον ἐν οὐρεσιν ἔκλυε ποιμήν·
ὥς τῶν μισγομένων γένετο λαχὴ τε φόβος τε.

—*Iliad*, iv. 452–456.

† ἄδιον ὦ ποιμᾶν τὸ τεδὸν μέλος, ἡ τὸ καταχῆς
τῇν' ἀπὸ τᾶς πέτρας καταλείβεται ὑψόθεν ὕδωρ.

—*Theoc. Id.*, i. 7–8.

‡ —ἐν τε βαθείαις
ἀδείας σχίνοιο χαμευνίσιν ἐκλίνθημες,
ἐν τε νεοτμάτοισι γεγαθότες οἰναρείοισι·
πολλοὶ δ' ἄμμιν ὑπερθε κατὰ κρατὸς δονέοντο
αἰγείροις πετλαί τε· τὸ δ' ἐγγύθεν ἱερὸν ὕδωρ·
Νυμφᾶν ἐξ ἄντροιο κατειβόμενον κελάρυσδε·

—*Theoc. Id.*, vii. 132–137.

Adown it, pouring from the foot of Pindus
 Peneüs rolls in foam his rapid wave,
 Till, clad in sudden mist, at one deep plunge,
 He rains his spray upon the tree-tops high,
 And with his thunder stuns the distant vale.*

In English literature waterfalls seem to have been only cursorily mentioned until the time of Thomson. That poet led the way in his "Summer" by the minute and truthful but rather too literal transcript of nature, beginning "Smooth to the shelving brink." Byron, in his famous stanzas on the Velino, laboured hard to say his best on the subject. Powerful as these lines are, they lack spontaneous sincerity. The air of effort is too manifest throughout, and has led to a general tone of exaggeration. After this ungracious prelude, we will frankly admit that no writer on the poetical aspect of cascades can venture to omit this magnificent contribution to the subject:—

The roar of waters!—from the headlong height
 Velino cleaves the wave-worn precipice;
 The fall of waters! rapid as the light
 The flashing mass foams, shaking the abyss;
 The hell of waters! where they howl and hiss
 And boil in endless torture; while the sweat
 Of their great agony, wrung out from this
 Their Phlegethon, curls round the rocks of jet
 That gird the gulf around, in pitiless horror set,

 And mounts in spray the skies, and thence again
 Returns in an unceasing shower, which round,
 With its unemptied cloud of gentle rain,
 Is an eternal April to the ground,
 Making it all one emerald: how profound

* *Est nemus Hæmoniae, prærupta quod undique claudit
 Silva: vocant Tempe, per quæ Peneus, ab imo
 Effusus Pindo, spumosis volvitur undis:
 Dejectoque gravi tenues agitantia fumos
 Nubila conducit, summasque adspergine sylvas
 Impluit; et sonitu plus quam vicina fatigat.*

—*Ovid, Met. i. 558-573.*

The gulf ! and how the giant element
 From rock to rock leaps with delirious bound,
 Crushing the cliffs, which, downward worn and rent
 With his fierce footsteps yield in chasms a fearful vent

To the broad column which rolls on, and shows
 More like the fountain of an infant sea
 Torn from the womb of mountains by the throes
 Of a new world, than only thus to be
 Parent of rivers, which flow gushingly
 With many windings through the vale :—look back !
 Lo ! where it comes like an eternity,
 As if to sweep down all things in its track,
 Charming the eye with dread—a matchless cataract,

Horribly beautiful ! but on the verge,
 From side to side, beneath the glittering morn,
 An Iris sits, amidst the infernal surge,
 Like hope upon a death-bed, and, unworn
 Its steady dyes, while all around is torn
 By the distracted waters, bears serene
 Its brilliant hues with all their beams unshorn ;
 Resembling, 'mid the torture of the scene,
 Love watching Madness with unalterable mien.

Although Scotland has so many fine waterfalls, Burns was not much inspired in the poor lines written on the Fall of Foyers. More successful is a stanza in the “Humble Petition of Bruar Water” :—

Here, foaming down the shelvy rocks,
 In twisting strength I rin ;
 There high my boiling torrent smokes,
 Wild roaring o'er a linn.

No one has ever described an Alpine stream better than Coleridge in the Hymn on Mont Blanc :—

And you, ye five wild torrents fiercely glad !
 Who called you forth from night and utter death,
 From dark and icy caverns called you forth,
 Down those precipitous, black, jagged rocks,

For ever shattered and the same for ever?
 Who gave you your invulnerable life,
 Your strength, your speed, your fury, and your joy,
 Unceasing thunder and eternal foam?

Wordsworth, as might be expected, has many noble passages on so prominent a feature of mountain scenery as cascades. It is impossible to omit part of his sonnet on the Torrent at the Devil's Bridge, North Wales:—

How art thou named? In search of what strange land,
 From what huge height descending? Can such force
 Of waters issue from a British source,
 Or hath not Pindus fed thee, where the band
 Of patriots scoop their freedom out, with hand
 Desperate as thine? Or come the incessant shocks
 From that young stream, that smites the throbbing rocks
 Of Via Mala?
 Such power possess the family of floods
 Over the minds of poets, young or old.

The opening stanza on Cora Linn is also fine:—

Lord of the vale! astounding flood!
 The duller leaf in this thick wood
 Quakes—conscious of thy power;
 The caves reply with hollow moan;
 And vibrates to its central stone
 Yon time-cemented tower!

Tennyson has several references to

The waterfall,
 Which ever sounds and shines
 A pillar of white light upon the wall
 Of purple cliffs, aloof descried.

—*Ode to Memory.*

How daintily skilful are his touches also in the "Lotus-eaters":—

And like a downward smoke, the slender stream
 Along the cliff to fall and pause and fall did seem.!

A land of streams ! some like a downward smoke,
 Slow-dropping veils of thinnest lawn, did go ;
 And some through wavering lights and shadows broke,
 Rolling a slumberous sheet of foam below.

Again, we have a fine picture in *The Princess* (part 3):—

And up we came to where the river sloped
 To plunge in cataract, shattering on black blocks
 A breadth of thunder. O'er it shook the woods,
 And danced the colour.

Treatment of Rivers in General.—Spenser, in the Eleventh Canto of the Fourth Book of the *Faery Queen* brings in the marriage of the Thames and Medway, treating it in the mythological style of the classical Renaissance. The rivers appear as gods or goddesses ; Neptune and Amphitrite come to grace the festival as the sovereigns of the sea ; the gathering takes place in the hall of Proteus. After Spenser's fashion, the action is rather languid, but some of the characteristic lines are pretty. We have

The fertile Nile, which creatures now doth frame ;
 and Long Rhodanus, whose source springs from the sky ;
 and Rich Oranochy, though but knowen late ;
 And that huge river which doth bear his name
 Of warlike Amazons which do possess the same.

Among the epithets are stately Severn, storming Humber, chalky Kennet, speedy Tamar—

The spacious Shannon, spreading like a sea,
 The pleasant Boyne, the fishy, fruitful Ban.

The stony shallow Lone
 That to old Lancaster his name doth lend.

The following entry of the bridegroom upon the scene, at-

tended by his parents, will probably satisfy the most curious reader:—

Soon after whom the lovely bridegroom came,
 The noble Thames with all his goodly train,
 But him before then went, as best became,
 His ancient parents, namely the ancient Thame;
 But much more aged was his wife than he—
 The Ouse whom men do Isis rightly name;
 Full weak and crooked creature seemed she,
 And almost blind through eld, that scarce her way could see.

In leaving Spenser, we may remark *en passant* his odd blunder, hardly pardonable even in the nursling of another university, of placing Oxford upon the Thame, not on the Isis.

Drayton, in his *Polyolbion* (1st part published 1612, 2nd part 1622), introduces most of the English rivers, giving accurate topographical details about them in his long cumbrous lines. In the original folio editions quaint maps of the counties are given, in which rivers are represented, as at present, by winding lines, but with the addition of a male or female figure starting out of them, apparently to indicate pictorially their personification in the poem.

Milton, at college (1620), was perhaps thinking both of Spenser and of Drayton when he wrote the well-known lines, with their epithets far more happily assigned than by either predecessor:—

* Rivers, arise : whether thou be the son
 Of utmost Tweed, or Ouse, or gulfy Dun,
 Or Trent, who, like some earth-born giant, spreads
 His thirty arms along the indented meads,

* It is not perhaps so well known that this address to Rivers is a ponderous joke, being really a play upon the name of a fellow-student, one of the sons of Sir John Rivers of Chafford, Co. Kent, Bart., a discovery of Mr. W. G. Clark. The boy Rivers had the name Relation given him in the curious Academic jest of which Milton had been appointed leader; and as Relation, i.e., one of the Predicaments, he is addressed.—See Masson's *Milton's Works*, vol. iii. p. 350.

Or sullen Mole, that runneth underneath,
 Or Severn swift, guilty of maiden's death,
 Or rocky Avon, or of sedgy Lea,
 Or coaly Tyne, or ancient hallowed Dee,
 Or Humber loud, that keeps the Scythian's name,
 Or Medway smooth, or royal-towered Thame.

In Shakspeare's plays we should hardly expect any but passing allusions to rivers; but we cull from him one very felicitous adjective—"sandy-bottomed Severn," which describes with great force the banks of sand and mud visible at low water in that wide estuary between the mouths of the Wye and Avon. Four good lines on the Thames—

O could I flow like thee, and make thy stream
 My great example, as it is my theme!
 Though deep, yet clear; though gentle, yet not dull;
 Strong without rage, without o'erflowing full;

are almost the only redeeming feature in a vapid descriptive poem by Sir John Denham, called *Cooper's Hill*.

To Dryden and Pope the Thames was generally "silver," brooks were especially addicted to "purling," and waterfalls meant ingenious spouts and spirts at the end of trim garden alleys. Since the days of Thomson, however, a more natural taste has swept away these conventionalities. We have already given some examples of truthful observation of cascades, but it would be tedious to quote every spirited bit of river scenery in the poets which have followed the lead of Thomson and Cowper. In modern times the noble series of thirty-four sonnets devoted by Wordsworth to the Duddon is the work most directly connected with a river. As we have already quoted from them, we will now only transcribe enough to show how well the poet could throw the light of genius over the last and apparently most prosaic stage of a mountain stream:—

Now expands
 Majestic Duddon, over smooth flat sands
 Gliding in silence with unfettered sweep!
 Beneath an ampler sky a region wide

Is opened round him :—hamlets, towers, and towns,
 And blue-topped hills behold him from afar ;
 In stately mien to sovereign Thames allied,
 Spreading his bosom under Kentish downs,
 With commerce freighted, or triumphant war.

Tennyson has in two passages drawn novel and original illustrations from the tidal phenomena which have been almost ignored by earlier poets. Thus in *Geraint and Enid* we have an allusion to slack water :—

But in some longer time
 Than at Caerlŷon the full-tided Usk,
 Before he turn to fall seaward again,
 Pauses. (Lines 964-7.)

Again, in *In Memoriam*, xix., we have another felicitous comparison :—

The Danube to the Severn gave
 The darkened heart that beat no more ;
 They laid him by the pleasant shore,
 And in the hearing of the wave.

There twice a day the Severn fills ;
 The salt sea-water passes by,
 And hushes half the babbling Wye,
 And makes a silence in the hills.

The Wye is hushed nor moved along,
 And hushed my deepest grief of all,
 When filled with tears that cannot fall
 I brim with sorrow drowning song.

The tide flows down, the wave again
 Is vocal in its wooded walls ;
 My deeper anguish also falls
 And I can speak a little then.

Matthew Arnold, in his *Sohrab and Rustum*, has also described the last stage of a river's career in graceful lines :—

But the majestic river floated on,
 Out of the mist and hum of that low land,
 Into the frosty starlight, and there moved
 Rejoicing through the hushed Chorasmian waste
 Under the solitary moon : he flowed
 Right for the Polar Star, past Orgunje,

Brimming, and bright, and large: then sands begin
To hem his watery march, and dam his streams,
And split his currents; that for many a league
The shorn and parcelled Oxus strains along
Thro' beds of sand and matted rushy isles—
Oxus, forgetting the bright speed he had
In his high mountain cradle in Pamere,
A foiled circuitous wanderer: till at last
The longed-for dash of waves is heard, and wide
His luminous home of waters opens, bright
And tranquil, from whose floor the new-bathed stars
Emerge, and shine upon the Aral Sea.

The mighty rivers of the tropics seem as yet to have been sung by no bard worthy of the theme. The Greeks knew well about the Nile, its lake-like inundations, and its mysterious sources ; but, although Theocritus migrated to Alexandria, he found no inspiration in the huge stream of his adopted land, but recurred in fancy to the tinkling brooks of Sicily. The Amazon and the Mississippi seem to crush all efforts of the imagination by their very vastness. We may quote, however, as the last of our extracts, Longfellow's pleasing attempt to portray the course of the Lower Mississippi (*Evangeline*, ii.) :—

Onward o'er sunken sands, through a wilderness sombre with forests,
Day after day they glided adown the turbulent river ;
Night after night, by their blazing fires, encamped on its borders.
Now through rushing chutes, among green islands, where plume-like
Cotton-trees nodded their shadowy crests, they swept with the current,
Then emerged into broad lagoons, where silvery sandbars
Lay in the stream, and along the wimpling waves of the margin,
Shining with snow-white plumes, large flocks of pelicans waded.

Entering the Bayou of Plaquemine,

Soon were they lost in a maze of sluggish and devious waters,
Which, like a network of steel, extended in every direction.
Over their heads the towering and tenebrous boughs of the cypress
Met in a dusky arch, and trailing mosses in mid air
Waved like banners that hang on the walls of ancient cathedrals.
Deathlike the silence seemed, and unbroken, save by the herons,
Home to their roosts in the cedar-trees returning at sunset,
Or by the owl, as he greeted the moon with demoniac laughter.

CHAPTER IV.

RIVERS IN THEIR RELATION TO HISTORY.

Is this the stream, whose cities, heights, and plains,
War's favourite playground, are with crimson stains
Familiar, as the morn with pearly dews ?

—*Wordsworth.*

Egypt and the Nile.—When we look back at the earliest records of history, we find that the oldest states of which we have any trace were founded on the banks of great rivers. Egypt was the land of the Nile, Mesopotamia, or Aram-Naharaim (the Syria of the Two Rivers) was almost as much the land of the Euphrates and Tigris. Of these two ancient seats of civilisation Egypt was the oldest, and in Egypt the river is everything. It waters a long narrow valley which is admirably defended on one side by the Sahara, and on the other by the Arabian desert. The almost total absence of rain is compensated for by the regular annual overflow of the Nile, which year after year prepares a soil of great fertility for the easy labour of sowing. At the same time, its fish and water-fowl afford another unfailing and abundant source of food. Its smooth and tideless current may have prompted to the invention of boats ; its spreading inundation must have compelled the adoption of dams and reservoirs and canals. The two parallel ranges of hills which border it supply the settlers everywhere with admirable building stone. We find thus that in ancient Egypt isolation and consequent security were combined with most of the conditions of material prosperity. There is no doubt, from the remains of cities still existing, that the valley of the Nile was very thickly

peopled at an early time. It is certainly provoking that historians can assign no trustworthy date to the beginning. The hieroglyphics which cover the monuments can now be read with a certainty, which at one time would have seemed incredible. But the results are disappointing. Only one point seems agreed upon, and that is that the ancient Egyptians had no idea of chronology. As yet, therefore, we can only vaguely say that the dynasty which built the Pyramids reigned long before the time of Abraham. These colossal tombs were reared during what has been called the Old Empire; contemporaneous with them was the highest development of art. During this period Memphis (near Cairo) was the capital. Then came the Middle Empire, when the centre of gravity was shifted further south to the great city Thebes (*No* of the Bible). If we judge by its stupendous architectural remains which cover miles on each side of the river, this must have been one of the most striking collections of vast temples and palaces and public buildings ever reared by man. The New Empire is supposed to begin with the xviiith dynasty, and in the xixth all specialists agree in placing the Exodus. Egypt lost its independence for ever when conquered by the Persian King Cambyzes, B.C. 525. Many historical students believe that the unique physical character of the river-valley of Egypt had a strong influence upon the national development. The solemn landscape, the huge river, never changing except from high to low and from low to high, the slight variations of season found in a subtropical climate—all are supposed to have moulded Egyptian life, to have caused it to stiffen into conventional forms and fixed invariable types. Whether that be so or not, the chief national characteristic was certainly this tendency to stereotype everything—religion, social institutions, art, architecture. This tendency was increased by the isolation and commercial self-sufficiency, which were due to their extraordinary geographical position. The sea they detested; foreigners, whose

imports were almost unnecessary, they despised. And yet navigation of a primitive kind was forced upon them from the first by the yearly inundation. At an early period the ancient Egyptians had skill enough to make small boats of papyrus-stalks smeared over with pitch. These frail barks, safe only on such smooth waters, were the astonishment of visitors from the time of Herodotus downwards. They are no longer to be seen in Egypt, because the paper-reed itself is there extinct, but Bruce found them still in use in Abyssinia. Primeval man probably everywhere seized the readiest materials for his works. As the dwellers in forest-countries hit upon a "dug-out," that is, scooped a canoe out of the trunks of trees, or covered a wicker frame-work with skins, so the Egyptians made use of the abundant reed-beds that then lined their river-banks.

The Cities of the Euphrates and Tigris.—Second in antiquity only to Egypt come the cities founded in the plains watered by the Tigris and Euphrates. These two rivers fertilise a broad depression between the Syrian plateau and the more elevated highlands of Persia. The lower part of this district, Babylonia proper, so famous for its fertility, would be a desert were it not for the irrigation rendered possible by the two mighty streams, which also have an inundation season, though not so regularly as the Nile. Soil and climate combine here also to give all the conditions of material prosperity. The great cities of these rivers were Nineveh and Babylon, of which the former has been recently discovered afresh. The plains-men of Mesopotamia, like the dwellers in the Nile Valley, were compelled by Nature to turn their attention to hydraulic engineering. Canals for irrigation, reservoirs for surplus flood-water, dams, and embankments, were familiar to both. In one respect the Babylonians and Egyptians were sharply contrasted: the former were great builders in brick, the latter in stone. Babylon itself was more a province enclosed by walls than a compact city, like

Rome or London. Quintus Curtius asserts that of the whole area thus fortified, which was more than 100 square miles, nine-tenths were occupied by gardens, parks, paradises, fields, and orchards. Everything was colossal at Babylon—the walls, the artificial terraced hills, the palaces. The huge mounds which still remain show that the statements of Herodotus and Diodorus were not exaggerated, incredible as they sound. In the middle ages Baghdad, on the Tigris, was for many centuries the capital of the Caliphs, and a seat of great commerce, for which it was well situated. It was founded by the Caliph Abu Jaafer al Mansur in A.D. 763, and retained its greatness till the year 1259, when it was taken by the Tartars under a grandson of Genghiz Khan. The present town is a poor modern survival, but many fine mosques and gateways remind the traveller of the famous days of Haroun al Raschid.

Valleys of the Indus and Ganges.—The history of the conquest of India by the Sanscrit-speaking Aryans belongs to the dim ages which precede authentic history, yet modern research has thrown a ray of light across the gloom, and revealed the main outlines of the invasion. The source of our information is derived from old epic poems, which still exist, though in more modern versions. These are the Rig-Veda and Mahabharata. From these venerable records we learn the following interesting facts:—At an early period, though long after the rise of Egypt and Babylonia, Aryan tribes left their home on the plateau of Iran, and began the conquest of India. Before this migration they would seem to have reached a stage of simple civilisation. This is reasonably inferred from the common vocabulary possessed by the languages which ultimately were differentiated from the primeval Aryan tongue. They tilled fields, reared cattle, built waggons and boats, forged weapons, had a simple mythology founded on the personification of powers of Nature. The sea was apparently unknown to them. These Aryan tribes entered India from

the north-west, and first occupied the upper course of the Indus and its tributaries, which they naturally called the Five-River Land—Punjab. When the Rig-Veda was written, about 1600 B.C. (Duncker's date in his *History of Antiquity*), they had not advanced further. The subsequent conquest which followed the Jumna down to the Ganges, and then the Ganges itself, is related in the *Mahabharata* (1500 B.C.). In this case the great rivers of the Peninsula for once determined the direction of invading tribes. We can only conjecture the date of the commencement of this movement; Duncker is inclined to be satisfied with 2000 B.C.

China.—Of the early history of China we know next to nothing. We cannot even conjecture when its peculiar civilisation took its rise, although it is obviously of great antiquity. But a study of the map makes it quite clear that China Proper coincides pretty well with the basins of the two enormous rivers, the Hoang-ho and Yang-tse-kiang, both of which flow eastward. As in the plains of Babylon, so in China, the immense volume of the rivers and their periodical inundations early led to hydraulic works on a large scale. The isolation of China must be connected, first, with its great extent and fertility, and consequent independence of foreign imports; and secondly, with the fact that it is cut off westward by the mountains and frightful deserts of the great central plateau of Asia, and eastward by the sea.

Main Stream of Ancient History.—If we follow the main stream of history, after leaving the primeval civilisations, we meet with the great empires of conquest which have practically influenced the course of western culture ever since the Persian, Græco-Macedonian, and Roman. In neither of these can much importance be ascribed to rivers. The founders of the Persian Empire were a hardy race of mountaineers from a bleak highland district. Greece contained a vast number of small independent states, divided from each

other by high and rugged mountain ranges, and united by the sea, which intersects it in every direction. The Greeks were naturally led, or rather driven, to be seamen and colonists. The Ionian race was perhaps the boldest and most adventurous, but the Dorians also, especially the Syracusans and Corinthians, founded trading towns along the coasts in every direction. The short-lived Athenian Empire was entirely a maritime one.

Rome did not owe her greatness to the Tiber, although the river helped in the early growth of the mingled tribes which founded a nationality of such extraordinary vitality and energy. When the Roman Empire had reached its Augustan stage, rivers became of political importance as its supposed frontiers. The Rhine and the Danube were its limits in one direction, the Euphrates in another. It is obvious, however, that rivers are only effective defences in a map; in real warfare they serve simply as an external ditch to a line of forts and works. Without sufficient garrison they are rather a source of danger, as they are so easily crossed summer or winter; indeed, Tiberius thought eight legions necessary for the Rhine frontier. How little dependence could be put upon the lower Danube is clear from the fact that during the Roman occupation it was frozen over every year, which is not now the case. The climate of all North Europe was then probably more severe from the greater amount of marsh and forest.

In modern times commerce has attained a magnitude which was unknown to the ancient world, and towns have increased very much in proportion to their advantages with reference to commerce. We have a most instructive example in London. Even from the earliest ages it was a trade emporium for several reasons. In the first place, it is situated on a tidal river of magnificent breadth and volume for so small an island. If a river is a *chemin qui marche*—a moving highway, a tidal river is a road which carries both ways alternately. In old days of

Celtic or pre-Celtic inhabitants, the river at high water spread out like a vast lake around a few islands, on one of which, Tower Hill, the first settlement was built. In the next place, the great river faces the continent; for a favourable position with reference to lines of traffic must co-operate with nature. The Mersey and the Clyde were of little use till steam had brought the American market to their doors. The noble estuary of the Shannon and the unrivalled haven at Milford are both thrown away, simply because no line of traffic can ever be made to flow through them, or at any rate has not yet been induced to do so. The great cities of the Netherlands were prosperous for the same reason as London. They are, at the same time, on noble estuaries, branches of the Rhine, Meuse, and Scheldt, and admirably situated with reference to continental traffic, being at the seaward extremity of a natural trading route.

Battles Named from Rivers.—As part of the political history of rivers, we can hardly pass over the fact that they have sometimes given their names to battles. Streams that would otherwise have been little known beyond their own neighbourhood have thus acquired a melancholy immortality on the page of history. Of the critical engagements which have decided the fate of the civilised world, perhaps the battle of the Metaurus is the only one named after a river. Still, many a victory in important campaigns has taken its name from a stream. For instance, the conquest of Western Asia by Alexander the Macedonian gave a colour to the whole future of the cultivated races of the globe. For it secured the diffusion of Greek language and ideas in Egypt, Syria, and Asia Minor. It founded Alexandria, destined to be, commercially and intellectually, a meeting-place of East and West; and in its remoter consequences, it decided what was to be the language of the New Testament and of the first school of Christian philosophy. But the first step in this great revolution was the victory on the Granicus, B.C. 334,

a river in Mysia, behind which a clever Greek general, named Memnon, in the Persian service, made the first ineffectual stand against the irresistible onset of the young Macedonian king. The career thus auspiciously begun ended in the complete conquest of the Persian Empire by 331 B.C. Alexander continued his eastern march through Cabul into the Punjab, advancing as far as the Sutledge, and was only prevented, by the refusal of his soldiers to go further, from marching to the Ganges.

A little more than a century after the death of Alexander in 324 B.C. at Babylon, the great Carthaginian general, Hannibal, crossed the Alps 218 B.C. with the daring purpose of destroying Rome. On the issue of this struggle depended the intellectual and moral future of Europe. At first the brave and skilful Carthaginian carried all before him. In two successive battles he defeated the two consuls, P. Cornelius Scipio and Tib. Sempronius Longus. The first of these engagements was named from the Ticino, which flows from the Lago Maggiore into the Po; the second from the Trebbia, a tributary which joins the latter on its right bank. After Hannibal had been eleven years in Italy, inflicting great losses upon his resolute foes, his own army stood in urgent need of reinforcement. In 207 B.C., his brother Hasdrubal, who had been left in Spain, attempted to effect this all-important relief. He was met by the two consuls, M. Claudius Nero and M. Livius Salinator, at the small Umbrian river, Metauro, completely defeated, and slain. Both sides felt this action to be decisive. Rome breathed freely once more, and her mighty invader foresaw the ultimate downfall of Carthage:—

Occidit, occidit
Spes omnis et fortuna nostri
Nominis, Hasdrubale interemto.

—*Hor. Od.*, iv. 4. 70.

(It is perished, it is perished,
All the hope and good fortune of our race,
With the slaughter of Hasdrubal.)

But in military history the passage of a river is sometimes as great a feat as a battle, and equally deserving of record. The Rhine, for instance, below Coblenz, is a broad, deep, and rapid river. Julius Cæsar thought it worth his while to give an elaborate account of the wooden bridge which he devised for crossing it (*De Bello Gallico*, iv. 17). The exact scene of this event is, according to local tradition, the village of Engers, a little above Andernach. The bridge was built in ten days, as Cæsar proudly records; it was partly intended as a demonstration of Roman skill and power, and after serving its temporary purpose was again destroyed (B.C. 55).

More interesting to Englishmen, perhaps, was the brave way in which the same General's troops crossed the Thames the next year, 54 B.C. It is the only British river which Cæsar names, though he must have seen the Stour, the Mole, the Wey, and perhaps the Medway. The British tribes, usually at war with each other, had laid aside their quarrels in the presence of a common danger, and had placed Cassivelaunus at their head. This prince had drawn up the forces of the confederacy under him on the left or north bank of the Thames, at the first place beyond the tide-way where it could be forded (*De Bell. Gall.* v. 18). The opposite bank and the bed of the river were protected by sharp stakes. Cæsar's men, however, though the infantry were up to their necks, crossed with such resolution and rapidity, that the Britons fled appalled at the disciplined courage of the invaders. The site of this event is usually fixed at Coway Stakes, where Bede (*Hist. of Brit.* i. 2) affirmed that the remains of the palisade were still visible in the 8th century. We may add that the summer of 54 B.C. is known to have been a dry one on the Continent (*B. G.* v. 24).

But far more famous in the life of Cæsar was his passage of the Rubicon. This is a small brook flowing into the Adriatic, a few miles north of Ariminum (Rimini). It separated Umbria from Cisalpine Gaul, which at that time was

not regarded as Italian soil. The importance of the passage of the Rubicon arose from its being the symbol of a great decision. In theory, the Senate was still the supreme power in the Republic of Rome, and the Senate had commanded Cæsar to disband his army in his province of Gaul. Would he obey? After some hesitation he marched into Umbria, and thus virtually began the civil war which ended in the death of Pompey, the Senatorial champion, and his own elevation to unquestioned supremacy. Later times loved to invest this act with a halo of mystery. The poet of the *Pharsalia* introduces the figure of personified Rome. As the daring leader approached the banks of the fatal stream in the gloom of early dawn, the shadowy form of his trembling Mother Country appeared to him, with deep sorrow in her countenance and her gray locks streaming from under her crown of turrets, and thus addressed the army—"How much farther are ye advancing? Whither are ye bearing my standards, O men! If ye come as loyal citizens, thus far and no farther may ye tread."*

Cæsar, in a long answer rather too rhetorical for the occasion, throws the responsibility upon his rival:—"He will be the guilty man who has made me your enemy."† As he crosses, he is made to say—"Here, here I leave peace and violated law: Fortune, I follow thee: away henceforth with leagues and covenants: we have trusted all to destiny, and battle must decide between us."‡ Even Suetonius (*Life of Julius Cæsar*, c. 32) breaks out into the blossom of a legend on this subject: As Cæsar was in suspense, there suddenly appeared the figure

* Quo tenditis ultra?

Quo fertis mea signa, viri? Si jure venitis,
Si cives, huc usque licet.

—*Lucan. Pharsalia*, i. 185-227.

† Ille erit, ille nocens, qui me tibi fecerit hostem.

‡ Hic, ait, hic pacem, temerataque jura relinquo:
Te, Fortuna, sequor: procul hinc jam fœdera sunt,
Credidimus fati, utendum est iudice bello. —

of a tall and comely youth seated near the troops and playing on a pastoral pipe. As the shepherds and soldiers thronged round him, he suddenly snatched his trumpet from one of the buglemen, rushed to the river, blew an inspiring blast, and disappeared. Cæsar said—"Let us go whither the portents of the gods and the injustice of our enemies call us. Let the die be cast." Plutarch, in his *Life*, mentions only the last expression (*ἀνερρίπθω κύβος*). It is curious that there is now some difficulty in identifying the brook which has become thus proverbial. It seems that geographers have to deal with two claimants, the Luso and Fiumicino, which both appear to satisfy the conditions. In 1756 a Papal bull pronounced in favour of the Luso, and the peasants on its banks still call it the Rubicone. In spite of these strong arguments from authority, Mr E. H. Bunbury seems to favour the other more (Smith's *Dic. of Anc. Geog.*, *sub voce*). In the course of nearly two thousand years such small streams may possibly have changed much along a coast which has witnessed immense alluvial growth.

In our own "rough island story," few decisive battles have been named from rivers. A fierce skirmish at Otterbourne (A. D. 1388) between the two Border leaders, Percy and Douglas, is supposed to have given rise to the old ballad of Chevy Chase:—

The Percy out of Northumberland,
And a vow to God made he,
That he would hunt in the mountains
At Cheviot within days three,
In the mangrè of doughty Douglas,
And all that ever with him be.

The stream Bannockburn has given its name to the great victory won by Robert the Bruce over Edward the II. in 1314, which secured, for all time, the independence of Scotland. Long after, James the Second's cause was finally lost

at the Battle of the Boyne, 1690. In the Crimean War the Alma gave its name to a victory gained by the allied forces over the Russians (20th Sept., 1854), commemorated in graceful lines by Trench:—

Though till now ungraced in story, scant although thy waters be,
Alma, roll those waters proudly, proudly roll them to the sea.
Yesterday unnamed, unhonoured, but to wandering Tartar known,
Now thou art a voice for ever, to the world's four corners blown.

River-islands.—Occasionally the smooth bosom of a large river is interrupted by islands. These are almost always picturesque. Sometimes they are patches of low ground, as in the Thames, fringed with willows and rushes and water-flags; sometimes they are rocky, like huge vessels anchored in the stream. In our own country they are usually called aits or eyots, meaning small islands; but, in the estuary of the Severn, an old Norse word is used for the Flat and Steep Holmes. Islands are very numerous in the Danube, and not uncommon in the Rhine. The comparative security of these spots has caused them, in different ages of the world, to be used for curiously contrasted purposes.

We will begin with Philae, two small islands which form one of the most charming landscapes in the Egyptian part of the Nile. The name is a Greek modification of *Philak*, or boundary, a title due to their position near the southern frontier of Egypt. The smaller island is remarkable for its splendid architectural remains. It is a mass of syenite, only 1,250 feet long and 400 broad: its sides are steep, and have probably been artificially escarped; along their summits a lofty wall once encompassed the territory. It was sacred, principally to Osiris, and was considered one of his burying-places. As a matter of fact, however, the two islands were not exclusively devoted to religion, but also formed centres of trade between Meroe and Memphis. The beautiful temples on the smaller islet exhibit a late revival of native architecture in Roman times. They have suffered much from the

zeal either of Christians or Mohammedans or both. A Christian congregation once met within the shadow of one of them.

In the Middle Ages many river-islands were, for similar reasons, the seats of convents or monasteries. As a typical example may be cited, Rolandswerth* or Nonnenwerth, the isle of Roland or of the Nuns, situated in the midst of the charming landscape of the Drachenfels. A nunnery, under Benedictine rules, existed here at a very early period, as it is mentioned in documents of the 12th century. It suffered much at the hands of the Swedes in the Thirty Years' War, and was dissolved in 1802. The present buildings date from 1673, with the obvious exception of some recent additions, and are now occupied by a Protestant Deaconess' Institution. Opposite to it is the ruined tower of Rolandseck, named from an old tradition that the famous Paladin took up his abode there in order to enjoy the sight of his lost bride, who had entered the Nunnery in the island below.† This fable,

* Werth or Wörth, Werder, in old German meant river-island: so probably, Wands-worth, Isle-worth, &c.

† Campbell (a poet now, perhaps, too much neglected) has treated the subject with his usual lyrical felicity in "The Brave Roland":

The brave Roland—the brave Roland —
False tidings reached the Rhenish strand
That he had fallen in fight;
And thy faithful bosom swooned with pain,
O loveliest maiden of Allémayne!

For the loss of thy own true knight.

But why so rash has she ta'en the veil,
In yon Nonnenwerder's cloisters pale

For her vow had scarce been sworn,
And the fatal mantle o'er her flung,
When the Drachenfels to a trumpet rung—

'Twas her own dear warrior's horn.

Wo! wo! each heart shall bleed—shall break!
She would have hung upon his neck,
Had he come but yester-even;

obviously inconsistent with Roland's supposed death at Fontarabia, was coolly transferred by Schiller, to Switzerland, in his well-known ballad, "Knight Toggenburg." Two rocky islets in the Rhine are well-known from being crowned by picturesque towers, and both have given rise to legends. We may speak first of the famous Mäusethurm or Rat-tower. It is on a rock rising from the river, a little below Bingen, and was probably built in 1000 A.D., by Archbishop Willigis, for defensive purposes. Apparently it had long been used in the Middle Ages as a toll-tower or *Mauth-thurm*, and the odium thus attached to it appears to have changed its name into Mäuse-thurm or Rat-tower, and then to have accounted for the name by the well-known legend which has been versified by Southey. The Archbishop Hanno of the story was the second of that name, and died 969 A.D., surely before the tower could have been built. The ruins were restored in

And he had clasped those peerless charms
That shall never, never fill his arms,
Or meet him but in heaven.

Yet Roland the brave—Roland the true—
He could not bid that spot adieu ;
It was dear still, midst his woes ;
For he loved to breathe the neighbouring air,
And to think she blessed him in her prayer,
When the Hallelujah rose.

There's yet one window of that pile,
Which he built above the Nun's green isle ;
Thence sad and oft looked he,
When the chant and organ sounded slow,
On the mansion of his love below,
For herself he might not see.

She died !—he sought the battle-plain ;
Her image filled his dying brain,
When he fell and wished to fall ;
And her name was in his latest sigh,
When Roland—the flower of chivalry,
Expired at Roncevall.

1856. Near Caub is another picturesque fort rising from the broad stream, and called the Pfalz. It has been asserted that the wives of the Elector Palatine of the Rhine were accustomed to go to this rude watch-tower for their accouchement, but no evidence is forthcoming of a statement obviously improbable.

River-islands, which consist of strips of meadow enclosed by the branches of an impetuous stream, would naturally suggest themselves as scenes of combat. All readers of the *Fair Maid of Perth* will remember the skill with which Scott introduced the historical combat between the two clans, Chattan and Quhele, on the North Inch in the Tay. Runnimede, so famous in English history, is not an island any further than any long stretch of meadow may be considered so which is surrounded more or less by water-courses. Tradition has given the name Charter Island to a small ait in the stream, but the document itself professes to have been signed *in prato quod vocatur Runnimede*. There are two river-islands which have been the scene of important transactions on the northern frontier of France and Spain. It happens that the Spanish river Bidassoa, before it reaches the Atlantic, serves, for about nine miles, as a boundary between the two States. At high water it spreads out as a wide estuary, at low tide it presents to view a vast extent of mud-banks. In this part of its course lie two islands, the Isle of Pheasants and Conference Isle, which have often been confounded as one. These little patches of land, being neutral territory, have been chosen for several momentous interviews. On the Isle of Conference Louis XI., King of France, met Henry IV., King of Castille, on which occasion, Commynes tells us, the splendidly dressed grandees of Spain were much scandalised at the modest appearance of the French monarch. In 1615 the Ambassadors of the two countries came here to exchange two destined brides, Isabelle, sister of Henry IV. of France, who married Philip the IV., and the sister of the

last-named, Anne of Austria, the betrothed of Louis XIII. In 1660, Cardinal Mazarin came here to arrange with Louis de Havo another royal marriage between Louis XIV. and the daughter of Philip IV. The negotiation lasted four months, and was saddened by the death of Velasquez, who was painting the galleries erected in the middle of the stream. On the 6th June, after all had been arranged, the two sovereigns swore peace and amity in the Isle of Pheasants, and, on the next day, Louis XIV. sought his bride in the same spot, and conducted her to St. Jean de Luz. It was in the middle of the stream that Francis the First was released from captivity, in exchange for his two sons, the transaction taking place in boats (1526).

In a few instances river-islands have been the nucleus of great cities. The first part of Paris to be inhabited was the Ile-de-la-cité on which the Cathedral of Notre-Dame stands. The small island in the Tiber, at Rome, was, however, of no importance.

One of the most singular incidents in connection with rivers was the burial of the great king of the Visigoths, Alaric, who was the first barbarian leader, since the time of Brennus, to enter and sack the city of Rome, and who died in 410 A.D. His followers diverted the little stream, Busento near Osenza in Calabria, buried him in its bed, and then brought the river back to its wonted channel. The workmen employed in constructing the tomb were put to death. The motive of this strange act, which is not without a gleam of savage poetry, seems uncertain; perhaps it was connected with some old religious custom of the tribe.

Bridges.—Far more pleasing than memories of strife and battle are those which record the successive steps in the subjection of nature. Prominent among the unobtrusive but real blessings of civilisation are bridges, while many of them deserve to rank among the greatest triumphs of man's constructive ingenuity. In early times very primitive substitutes

for these conveniences seem to have prevailed. For a small stream stepping-stones or the trunk of a tree would be a natural suggestion, for a larger one a search for a ford was indispensable. Of the importance of fords we have many indications in the number of local names derived from the circumstance, as Thapsacus on the Euphrates, Hereford, Oxford, Frankfurt, &c. As the use of boats was discovered, a ferry would take the place of the dangerous and disagreeable wading through the water. When we examine the history of the great building nations of antiquity, we are surprised to find the construction of stone bridges to be so late an event. The Egyptians were essentially devoted to architecture, but it did not take that form. Small wooden bridges over their innumerable canals must have been common, but they did not apparently feel the necessity of crossing their mighty river otherwise than in boats. As the Euphrates flowed through the middle of Babylon, we are not astonished to hear of a connecting link between the two halves. Herodotus ascribes it to Nitocris. It was 1000 yards long, and probably consisted of stone-piers, overlaid with planking, which was removed at night. Whatever bridges existed in Greece were probably of this type, but none are known earlier than the date of Roman occupation. As has often been justly remarked, the Athenians, while lavishing their subtle genius upon the temples of the Acropolis, forgot to bridge the Cephissus, which perhaps was dry every summer. It is to the Romans that we owe the first application of the round arch to the purpose of bridge-building, for which it is so well fitted. Even at Rome, however, the oldest bridge was a wooden one, the famous *Pons Sublicius*, made immortal by the feats of Horatius Cocles, familiar to English children in the manly strains of Macaulay. From some religious considerations this ancient bridge was constantly rebuilt in wood, no metal fastenings being allowed, and hence the chief priests were called Pontifices, or Bridge-makers—a name afterwards

ludicrously assumed by the Popes. But several of the present stone bridges in and about Rome are of ancient construction, though sometimes they have been modernised. Such are three in the city—the Fabrician and Cestian, leading to the Island, and the Aelian, built by Hadrian, now called the Bridge of San Angelo. Near Rome is the Milvian Bridge, or Ponte Molle, built by the Censor Aelius Scaurus, about 100 B.C. But it is in the provinces that the Romans constructed bridges worthy of their material greatness. In these erections, as in all their works of public utility, we admire an air of latent strength, of majestic solidity, which is at the same time combined with perfect adaptation to their purpose. They seem to have been intended to last for ever. One of their finest was built by the order of Trajan, 105 A.D., in Spain, over the Tagus. The Moors have given the name Alcantara (the Bridge) to the adjoining town, which is in the province of Estremadura, near the Portuguese frontier. The river is liable at this place to immense variations of level. The bridge is consequently very high, the roadway, which is perfectly level, being 140 feet above the ordinary bed of the stream. It is indeed more what is now called a viaduct which happens to cross a river than a bridge. The same Emperor employed a Greek architect, Apollodorus, to build a bridge over the Danube, below the Iron Gate. The foundations of the piers of this structure have been seen in the bed of the stream, when the water has been unusually low, at a village called Severin, where the width of the river is 1,300 yards. The superstructure for this great length was probably of wood. Fine Roman bridges, still in good preservation, are to be seen at Rimini, Narni, Merida, and other places. After the irruption of the Barbarians into the Roman Empire, there was a long intermission in the building of bridges, except on the part of the Moors in Spain, who built a bridge over the Guadalquivir, at Cordova, under Hashem, the son of Abderrahman.

At length the dawn of a brighter day appeared in the South of France, where a religious fraternity was established, the object of which was to build bridges, to maintain ferries, and to establish roadside inns near the most frequented fords. They received the official sanction of Pope Clement III., and built a bridge at Avignon (1176-1188) and at Lyons. This brotherhood claimed as their founder a shepherd named Benezet, who was afterwards canonized. From this date onwards many remarkable bridges were built in mountainous countries under the direction of the monks. Their extraordinary boldness of design has often given them the popular title of Devil's Bridge, as, for instance, near Aberystwith, where the single arch so-called is said to have been thrown over the raging stream by the monks of Strata Florida Abbey, in the reign of William Rufus. A very curious bridge is found near Croyland, consisting of three pointed arches over three distinct water-courses, which meet from different directions. In modern times we are so familiar with the feats of civil engineers that it would be tedious to enumerate the marvelous structures which bear our railroads high over deep ravines or stormy estuaries. The story, alas! is not one of unbroken triumph: the wild forces of nature have on one sad and memorable occasion swept away the long bridge that crossed the tidal course of the Tay (28th Dec., 1879).

In mountainous countries necessity has long ago taught the inhabitants to find some way of bridging over deep ravines and chasms. In the Himalayas they employ the *Calamus Rotang*, and other species of Cane-Palm or Rattan, which have the habit of growing to a prodigious length. Dr. Hooker thus describes one that he himself passed over, (*Himalayan Journals*)—"Two parallel canes, on the same horizontal plane, were stretched across the stream; from these others hung in loops, and along the loops were laid one or two bamboo stems for flooring; cross pieces below this flooring hung from the two upper canes, which they thus served

to keep apart. The traveller grasps one of the canes in either hand, and walks along the loose bamboos laid on the swinging loops." Somewhat similar were the suspension bridges used in the Andes along the great roads constructed by the Peruvian Incas. These were made of thick ropes manufactured of the fibres of the *Agave Americana*, several cables being bound together with pliant osier-twigs, and then covered over with earth and branches of trees. Humboldt describes a bridge of upwards of 130 feet span, over the Chimbo, in Quito, of which the main ropes, four inches in diameter, were made of agave fibre.

What are called "flying bridges" are common on the Rhine and Moselle, and are very useful and cheap. Practically they are ferry-boats, varying of course in size and convenience, but differing from ordinary ferry-boats in the mode of propulsion, which is done by the current itself. This is effected by the raft being attached by a very long chain to some fixed point higher up the stream. When pushed from the bank athwart the current, the boat is suspended at the end of a taught line, and when properly guided shoots across the river. Where the current is strong, and the slight traffic hardly warrants any more expensive apparatus, it is a very effective plan.

A tunnel under a river is under any circumstances a triumph of engineering skill, but it is only at the present stage of railway enterprise that it has become profitable. For a long time the Thames Tunnel was the solitary representative of the class. Begun in 1825 from Brunel's designs, it was not completed till 1843, at a cost of £1,137 for each yard out of the 420 of its length. As a roadway for passengers it proved a failure, and it is now a railway tunnel. In the forty years that have elapsed since its construction, the invention of rock-boring machinery and other devices for saving labour have advanced the art of tunnelling immensely, and the ease and economy with which the Tower Sub-way

was driven under the same river, formed a striking contrast to the difficulties and expense of the first undertaking. At the present date (1884) two important works of this class are being carried on by railway companies in England. The Great Western is constructing a tunnel under the estuary of the Severn, which will be $4\frac{1}{2}$ miles long, the portion actually under the river being $2\frac{1}{4}$ miles. For most of this distance the crown of the tunnel will be some 140 feet below high-water mark, and 80 to 100 feet beneath the bed of the river. In the prosecution of this bold design, much delay has been caused by striking several underground springs, one of which was computed to pour in 6,000 gallons a minute, but ultimate success is only a work of time. A similar means of communication is being made under the Mersey, where it is about 1,230 yards wide. In this case the engineers have been fortunate enough to bore through good solid rock of the New Red Sandstone formation, and have made steady progress uninterrupted by any accidents.

The Place of the Rhine and Danube in European History.—No river in the world has been more intimately connected with history than the Rhine. During the Roman Empire it served for four centuries as the nominal boundary between Romanised Gaul on one side of it and the unsubdued German tribes on the other: but even then we are told that its left bank, in the so-called Gaul, was inhabited by Germans who had submitted to Rome. The large number of eight legions was thought necessary to garrison this frontier. Roman camps and colonies have in many cases developed into towns; thus, Basilia is Bâle, Argentoratum is Strasburg, Moguntiacum is Mayence, Colonia Agrippinensis is Cologne. But in the chaotic state which followed the great movements of nations in the fifth and sixth centuries, the Rhine lost its frontier character, and for a long time was wholly included in the Kingdom of the Franks. When after long struggles the germs of modern Europe began to appear, and the Carlovingian

Empire gradually resolved itself into French, German and Italian elements, the Rhine appears as a purely German river. Four of the Electorates included some portion of its course, that is the three ecclesiastical electorates—Mayence, Trèves and Cologne, and the so-called Palatinate. Besides these relatively important states were a vast number of small territories, many being fiefs of the Empire, and the free Imperial cities—Worms, Spires, and Strasburg (the last on the Ill, but practically a Rhenish town). During many centuries the lands on each bank of the Rhine were exclusively German from its cradle in the Alps till it loses itself in the marshes of Holland, when we use the word German in its widest sense. The German local names on the map sufficiently attest this, and nowhere more emphatically than where they have been disguised by French manipulation. It was as late as 1648 that part of Alsace was ceded to France, nearly all the remainder not being swallowed up till 1697; Lorraine was seized by Louis XIV. in 1670, restored to the Duke in 1697, but again united to France in 1766. When the Germans, after their successes in 1870, not unnaturally reclaimed these German provinces, it was conclusively demonstrated that a great river is not a natural boundary. France, however, is still possessed with the notion that she is the representative of the ancient Gauls, and it is to be feared that a quarrel that never can be ended by force will once more bring misery and desolation on the banks of this noble river—so often the witness of sanguinary and senseless wars.

The rôle of the Danube in the great drama of European history has been very different. Instead of acting as a boundary even in name, it has been much more a great thoroughfare, a means of communication. Along its line migrations and invasions have taken place, sometimes from east to west, and more rarely in a reverse direction. As a glance at the map shows, the Danube belongs to no nationality, but unites many.

CHAPTER V.

SUPERSTITIONS CONNECTED WITH RIVERS.

The intelligible forms of ancient poets,
The fair humanities of old religion,
The power, the beauty, and the majesty,
That had their haunts in dale, or piny mountains,
Or forest, by slow stream or pebbly spring,
Or chasms and watery depths : all these have vanished—
They live no longer in the faith of reason !

—Coleridge, *Wallenstein*.

WHEN the worship of the phenomena of the external world had once begun among early races of men, it was only natural that rivers should find a place in the primeval pantheon. For in the infancy of speculation motion, if not obviously caused by a visible agent, was usually ascribed to life. The sun was alive, because it mounted the vault of the heavens, and then descended it again. The winds were alive, because they swept over the forest and sea ; the clouds were alive which fled before them ; the river was alive, because it ran from the mountain to the coast. But in addition to this perpetual motion a great stream makes a wonderful impression of permanence, of unity, and we may almost say of personality. Generations come and go, but it flows on unchanged. It even seems to have moral attributes. In hot countries its fertilising inundations appear to be the acts of a benevolent power which spreads food and plenty around. It has also an angry aspect when it is swollen with mountain-torrents, or melted snow, and rolls its devastating flood through the peopled valley. Even now, in spite of the refrigerating effect of scientific habits of thought, how readily do we fall in with

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They live no longer in the faith of reason !

—Coleridge, *Wallenstein*.

WHEN the worship of the phenomena of the external world had once begun among early races of men, it was only natural that rivers should find a place in the primeval pantheon. For in the infancy of speculation motion, if not obviously caused by a visible agent, was usually ascribed to life. The sun was alive, because it mounted the vault of the heavens, and then descended it again. The winds were alive, because they swept over the forest and sea ; the clouds were alive which fled before them ; the river was alive, because it ran from the mountain to the coast. But in addition to this perpetual motion a great stream makes a wonderful impression of permanence, of unity, and we may almost say of personality. Generations come and go, but it flows on unchanged. It even seems to have moral attributes. In hot countries its fertilising inundations appear to be the acts of a benevolent power which spreads food and plenty around. It has also an angry aspect when it is swollen with mountain-torrents, or melted snow, and rolls its devastating flood through the peopled valley. Even now, in spite of the refrigerating effect of scientific habits of thought, how readily do we fall in with

the poetical imagination that addresses "Father Thames," with Gray, or, "Sylvan Wye! thou wanderer through the woods," with Wordsworth.

Worship of Rivers.—To the ancient Egyptians the Nile was sacred, and is said to have been worshiped under the mystic name of Hapee, or Hapee-mu—"the abyss of waters," or "the hidden." Still, as a god, the Nile was only one of the lower divinities. At the present day the Ganges is profoundly venerated by the Hindoos. It is the goal of constant pilgrimages, one of the chief places of resort, Gangotri, being only eight miles from its source, which is considered to be the "cow's mouth," or a glacier cave in the Himalayas. All along its course are ghauts or bathing-places, where the sins of those who wash in its waters are immediately expiated, and those who die on its banks pass into a joyful existence. The legends connected with it are, as usual in Hindoo mythology, grotesque and extravagant. We are told that it originated in the following manner:—One day in the remote past, Kali, the wife of Siva, put one of her fingers into the eye of her divine husband in a fit of playfulness. For a moment the god was blinded, and in his alarm at the possible consequences to the universe, trembled all over, while beads of sweat started on his brow. Fortunately the dread eclipse passed away instantly; the universe breathed freely, the god became calm, and the streaming sweat from his forehead formed the Ganges or Holy River. The name of the Brahmapootra (off-spring of Brahma) points to some similar connection with the god who has given it his title. A further and more graceful account of this side of ancient mythology is to be obtained from the remains of Greek and Roman antiquity. Every stream and fountain had its presiding divinity. Rivers—the aristocracy of these water-spirits, were called the children of Zeus, which at first was a mythological way of saying that they sprang from the rain of heaven. For some forgotten reason youths dedicated to them locks of hair. Bulls and live

horses were offered to them. The most delightful picture of the old Greek belief in their personality is presented to us in the twenty-first book of the *Iliad*. The River Xanthus (the Yellow) or Scamander is irritated by the carnage of the Trojans, who fell before the irresistible Greek hero, Achilles. This anger partly arises from sympathy with the inhabitants of the country through which he flows, and partly from his annoyance at his "pleasant streams" being choked with corpses. The river-god first puts on a human form, and expostulates with the hero from a deep swirling pool, but to no purpose. Achilles in reply leaps into the stream in pursuit of the fugitives. With a mighty rush of water the angry river, "roaring like a bull," throws out the bodies on his banks, and falls upon Achilles. The hero clings to an elm-tree which falls across the stream and helps him to spring out of the pool on to the plain. Achilles then flees over the level ground, but the river follows him, "as the rills follow the man who irrigates a field;" fleet-footed as is the Greek, the stream is fleetier still, and "splashes above his shoulders." Poseidon and Athene now come to his aid. Scamander accordingly summons his brother stream, Simois:—"Come to my help at once, and fill all your streams with water from the fountains, and swell all your channels, and set up a mighty wave, and rouse a loud din of logs and stones, to stop this savage man." So critical is the state of Achilles that the goddess Hera shouts aloud and summons, as a last resource, the Fire-God Hephæstus. It is only when elms and willows, and tamarisks and clover, and sedges and rushes, were on fire, and the very fish in the pools that the river yields. The story throughout has the charm of a fairy-tale, in which the characters are half persons and half natural phenomena.

In the *Odyssey* (book v. 441) we have another pleasing sketch of the popular Greek creed on the subject. Ulysses has been floating for two nights and two days "on the mighty billow," and at last is drifted to a rocky island.

Unable to land on the craggy shore he swims along the coast until he comes to the mouth of a river. Before venturing to enter this haven of rest, he begs "the lord of the stream, whoever he be," to pity him and receive him as a helpless suppliant. The river hears his prayer, and checks his current in order to make smooth water before him.

Sophocles lightly touches upon a legend of a river-god in the Trachinian women. Dejanira, an Aetolian princess, had been wooed by the great stream of her country, the largest in Greece, the Achelous. Three were the forms, she tells us, in which he pressed his odious suit, sometimes as a bull, sometimes as a glittering wreathing serpent, sometimes in a human body with the head of an ox, while streams of water flowed from his bushy beard. From this formidable marriage she is saved by Hercules, who defeats the river-god in single combat.

Still, it does not appear that river-gods always presented themselves in this terrible form; at any rate many of the Homeric heroes claimed to be their children.

After the lapse of nearly a thousand years Pliny the Younger (born 61 A.D.), in one of his pleasant letters (Lib. viii. 8) gives us a view of the practical veneration of streams in his day in Italy:—"Have you ever seen the fountain of the Clitumnus? If you have not yet done so (and surely you would have let me know if you had), go and see it. I am sorry that I have left it so late." He then describes it in picturesque language as rising at the foot of a gentle hill, shaded with groves of ancient cypress. Springing up from several heads it soon forms a deep pool as clear as glass, and after a very short course becomes a small river navigable by row-boats and punts. Its banks are clothed with ash and poplar; its waters are as cold as snow. Close by is an ancient temple in which is a statue of Clitumnus, clothed with the Roman robe of honour (*prætecta*). Around are smaller shrines, each with its little image. Some kind of divination

was carried on by lots at the temple. On all the walls and pillars were inscriptions in honour of the god and spring. Pliny hints that his correspondent would smile at some of these (from their simple faith, or roughness, or bad grammar), if he were not too good-natured to smile at any expressions of honest feeling. What Pliny here describes as existing, so late as the end of the first Christian century, was probably an Italian superstition, which had survived from a date earlier than the Roman conquest of Umbria. The little river was evidently considered a show-place; it was visited by the Emperor Caligula, and long after, by Honorius. Byron's lines on it in *Childe Harold* are familiar to all readers of poetry.

While the divinities of rivers were apparently considered as masculine, fountains were usually placed under the protection of female powers—the nymphs. These were indefinite in number, being themselves only a portion of a vast host dwelling, not only in fresh water, but also in the sea, in grottoes, on mountains, and in woods. Their connection with springs was supposed to give the water, in some cases, medicinal properties, in others poetical or prophetic inspiration. Castalia, a fountain on Mount Parnassus, is well-known as sacred to the Muses. One of the prettiest Greek legends accounted, in a supernatural way, for the fountain Arethusa on the sea-coast of Sicily. This is a copious spring which arouses attention by occurring close to the sea, at the very edge of the small island Ortygia, on which Syracuse was originally built, and to which it has again shrunk. The Dorian colonists from Corinth who founded it, amazed at this striking phenomenon, fondly looked upon it as a link with the mother country. As they were aware, the river Alpheius, flowing from the central highlands of Arcadia, ran into the sea almost exactly opposite to Arethusa (its mouth is about 300 miles from Syracuse). Hence arose the legend that the river-god chased the Nymph, but the Nymph, at her prayer

to Diana, was changed into a fountain, plunged into the sea, and burst up to the surface in Ortygia. Shelley has treated the subject in lines of surpassing beauty, though marked with characteristic inaccuracy:—

Arethusa arose
 From her couch of snows
 In the Acroceraunian mountains—
 From cloud and from crag,
 With many a jag,
 Shepherding her bright fountains.
 She leapt down the rocks,
 With her rainbow locks
 Streaming among the streams ;
 Her steps paved with green
 The downward ravine
 Which slopes to the westward gleams :
 And gliding and springing
 She went, ever singing
 In murmurs as soft as sleep.
 The Earth seemed to love her,
 And Heaven smiled above her,
 As she lingered towards the deep.

Then Alpheus bold,
 On his glacier cold,
 With his trident the mountains strook,
 And opened a chasm
 In the rocks—with the spasm
 All Erymanthus shook.

.
 The beard and the hair
 Of the river-god were
 Seen through the torrent's sweep,
 As he followed the light
 Of the fleet Nymph's flight
 To the brink of the Dorian deep.

“ Oh save me ! oh guide me !
 And bid the deep hide me !
 For he grasps me now by the hair ! ”
 The loud ocean heard,
 To its blue depth stirred,
 And divided at her prayer ;

And under the water
 The Earth's white daughter
 Flew like a sunny beam ;
 Behind her descended
 Her billows, unblended
 With the brackish Dorian stream.
 Like a gloomy stain
 On the emerald main
 Alpheus rushed behind—
 As an eagle pursuing
 A dove to its ruin
 Down the streams of the cloudy wind.

It should be added, however, that there was another distinct ground for the selection of the Alpheius as the river to reappear in Sicily besides its geographical position. Like many other streams which originate in the high mountains of Arcadia, it disappears repeatedly, in the limestone rock through which it flows, in the so-called *Katavothra*, or *Swallow-holes*. When Pastoral Poetry arose, the last birth of the creative imagination of Greece, Arethusa was chosen to preside over "its sweet pipings."

In the Middle Ages the veneration for wells long survived the decay of polytheism, the dispossessed Nymph being replaced by the Virgin or other saints. Holy Well, in Flintshire, is the best known in our island, named from a famous spring dedicated to St. Winifred. But similar instances of consecration abound in every European country, and are far too numerous to require to be given in detail.

Teutonic and Celtic Superstitions about Rivers.—In the gloomy mythology of the North we find rivers inhabited not so much by the personified Power of the Stream, as by mischievous beings called necks or nixes, *stromkarls*, and so on. Sometimes they are represented as wonderful musicians. The German male nixes are grotesque creatures, being old, long-bearded, green-toothed, and green-hatted ; the female, on the contrary, are beautiful maidens, but their bodies often terminate in that of a fish or horse. They have magnificent

dwellings under the water, to which they love to entice handsome fishermen. On sunny days they comb their golden locks, sitting on rocks or trees; a representation transferred to the better known mermaids when the German tribes took to the sea. The Lurley of the Rhine is a good example of the malignant river sprite, who, by her beauty, seduces the passing boatman to plunge into the swirling river. In the Scotch tales we find a similar spirit, the *kelpie*, unknown to our English rivers, who appears in the form of a horse, and when he has induced an unwary mortal to mount him, plunges with his rider into a pool or loch. This superstition probably arose from the physical difference between a mountain stream and one of the plains. In the former the river, after a long shallow stretch where it merrily runs over a stony bed, will suddenly form a deep black pool where the peat-brown water for ever goes circling round and round. In the depths of such a gulf (what fishermen know as a salmon pool) simple people might well believe in the existence of a spiteful and powerful elf. There are scarcely any traces of river worship to be found in the oldest Celtic literature, none of which dates from pre-Christian times. The oldest Welsh poems in existence are considered to have been written down in the 12th century, though perhaps composed in the 7th, but Irish manuscripts of the 8th century are numerous. In both cases they are long subsequent to the establishment of Christianity. Welsh scholars are agreed that among the faint vestiges of polytheism may be counted the name of the Dee (occurring in Wales and Scotland) meaning *goddess's water* = *dyfrdwy* in Welsh. Another old river name, Belisama, is said by Professor Rhys to be identified with the Italian Minerva in an inscription. We may thus guess that some of the obscure river names which have received all assaults of etymologists may embody the titles of forgotten local divinities.

Wey of Monmouth has preserved old legends with re-

ference to several British streams. Milton has chosen to introduce one into his beautiful poem, "Comus :"

There is a gentle nymph not far from hence,
That with moist curb sways the smooth Severn stream—
Sabrina is her name, a virgin pure
Whilom she was the daughter of Loocrine,
That had the sceptre from his father Brute.
She, guiltless damsel, flying the mad pursuit
Of her enraged stepdame Guendolen,
Commending her fair innocence to the flood,
That staid her flight with his cross-flowing course,
The water nymphs, that in the bottom played,
Held up their pearled wrists, and took her in,
Bearing her straight to aged Nereus' hall ;

The nymphs tend her there

Till she revived,
And underwent a quick immortal change,
Made goddess of the river : still she retains
Her maiden gentleness, and oft at eve
Visits the herds along the twilight meadows,
Helping all urchin blasts, and ill-luck signs
That the shrewd meddling elfe delights to make,
Which she with precious vialled liquors heals :
For which the shepherds at their festivals
Carol her goodness loud in rustic lays,
And throw sweet garland wreaths into her stream
Of pansies, pinks, and gaudy daffodils.

In the incomparable song of invocation that follows Milton has united the melody of the Italian canzone with the gem-like clearness of the finest choral snatches in the Greek drama :—

Sabrina fair,
Listen where thou art sitting
Under the glassy, cool, translucent wave,
In twisted braids of lilies knitting
The loose train of thy amber-dropping hair.
Listen for dear honour's sake,
Goddess of the silver lake,
Listen and save.

Milton's portraiture of Sabrina is in the main classical, but still with touches here and there of native fancies.

To descend to more modern times, the German romance-writer, La Motte Fouqué, has treated the subject of water-sprites with some success in his tale *Undine*. He has not, however, sought inspiration either in classical legend or in German fairy-tales, but in a curious old book called the *Entretiens du Comte de Gabalis*, from which Pope also borrowed the Sylphs and Gnomes of *the Rape of the Lock*. According to the so-called Rosicrucian creed, each of the four elements had assigned to it a peculiar race of beings, Fire possessing Salamanders, Earth Gnomes, Air Sylphs, and Water Naiads. La Motte Fouqué introduces, in addition, the pathetic notion, widely spread in fairy tales, that one of these fantastic creatures could acquire a human soul, and at the same time become subject to human death, if he or she gained the love of a human being. This central idea might have been powerfully developed in the hands of a master, but Fouqué was not a master, and could not make more out of it than a wild though pleasing tale for children. Undine is the daughter of a mighty sea-spirit who lives in the blue depths of the Mediterranean, and ardently wishes his daughter to gain the sad prerogative of humanity. She is accordingly left with a fisherman and his wife, in the place of their own child who is thrown in the way of a pair of noble birth who have no offspring. By a chain of events more or less supernatural, the young Naiad, when grown up, is married to a knight, and the wild, capricious daughter of the element becomes a grave and sympathetic woman. Her husband, however, neglects her in favour of the changeling, now her beautiful rival, and the story ends tragically. Undine's uncle, who is identified with a brook running
^{†1} through a forest is a picturesque figure; a gray misty form between a tall long-bearded, menacing old man, and a roaring torrent. Sir Walter Scott, in the *Monastery*,

attempted to introduce a somewhat similar being in the White Lady of Avenel :—

Something betwixt heaven and hell—
 Something that neither stood nor fell—

Neither substance quite, nor shadow,
 Haunting lonely moor and meadow.

But by universal consent it was one of his least happy efforts. Indeed, in the *Lay of the Last Minstrel* the "Spirit of the Flood" had been adversely criticised from the first.

In conclusion, it may perhaps be conjectured that the belief that witches could not cross a running stream without their spell being dissolved, arose from some surviving notion of the sacred character of rivers.

CHAPTER VI.

RIVERS OF FABLE-LAND AND ALLEGORY.

Abhorred Styx, the flood of deadly hate,
Sad Acheron of sorrow, black and deep,
Cocytus named of lamentation loud
Heard on its rueful stream, fierce Phlegethon
Whose waves of torrent fire inflame with rage.

—*Milton's Paradise Lost*, book ii.

BESIDES the actual rivers of the material globe which our bodily eyes have seen, there are streams which flow only through the shadowy landscapes of fable-land or allegory. They may be mere creatures of the poet's brain, or distorted images of facts of nature. Whatever their origin, a sombre charm has been thrown by the genius of mighty poets around such names as Styx, Acheron, and Lethe. It will be an interesting task to trace the growth of the primitive beliefs which clustered round the rivers when they still reflected articles of faith, and had not yet degenerated into poetical commonplaces.

In doing so we shall become acquainted with early attempts, which are not without their pathetic side, to pierce behind the veil which hides the future state from our eyes. At the same time we shall be led almost irresistibly to find traces in the graceful myths of Hellas of the older creed and mystical theology of Egypt.

Oceanus.—Before, however, entering upon the discussion of the famous streams of the Lower World, a more ancient river of fable demands our attention—Oceanus, or the Ocean. Strange as it appears to us with our present exact knowledge of the Earth, it is nevertheless certain that the Greeks of

Homer's time, and even of a much later date, thought Ocean to be a river. Let us forget for a moment that we have ever seen a map, and try to reproduce the geographical notions of a Greek who lived about the ninth or tenth century before Christ, as they are pictured to us with delightful freshness in the poems of Homer. "The Ionian father of the rest" was well acquainted with the Eastern Mediterranean. No one has more truthfully described the sea, so far as it fell under his observation. Consequently he was perfectly well aware what he meant when he called Ocean (which he had never seen) a river, and not a sea. He applies to it none of the many picturesque epithets which he lavishes upon the Mediterranean; he does not call it the loud-resounding, the hoary, the purple, the dark-gleaming, the restless, the spacious, the briny. To his mind it is a mighty stream encircling the round, or perhaps oval, disk of the world, and its attributes are those of a stream. It is the back-flowing, because it runs round and round with a current ever returning upon itself. It is the deep-flowing, the deep-eddying, the smooth-flowing—epithets elsewhere given to rivers. Like other rivers, it had its presiding deity, and we are expressly told in *Iliad*, xx. 7, that when Jupiter held a grand council of the gods on Olympus, all the Rivers were present except Ocean. In comparison with the "boundless" Sea, in which Ulysses wandered for years, it is represented as a narrow belt of water, for that long-suffering hero crosses it with a fair wind in a single day. Around it are grouped various fabulous peoples. On its western bank beyond the sunset is one of the approaches to the Kingdom of the Dead. Near this mysterious region dwelt the Kimmerians—* "a nation enveloped in mist and

* One is much tempted to see in this name faint traces of the Kymry, the ancestors of the Welsh, as a Celtic population had probably spread by this time along the west coast of Europe, from Spain to Britain. The high authority of Dr. Guest may now be quoted for this opinion; see his posthumous work, *Origines Celticae*.

cloud who never saw the sun, but were covered with baleful night." On its southern borders were the Pigmies—dwarfs only a span high, who had to fight every year for their life with the cranes when they migrated from northern lands. Bathed by its constant current and refreshed by its breezes was the Elysian plain, a kind of Paradise reserved for a few favourites of heaven, who were transported hither without seeing death. In the 24th book of the *Odyssey*, when the route taken by the souls of the slain suitors under the guidance of Hermes is described, they are led "past the streams of Ocean, and the White Rock, and past the gates of the Sun and the people of Dreams," and so onward till they come to the Asphodel Meadow. (The White Rock is the promontory of Leucas.) Lastly, in some mysterious way the Ocean-stream was looked upon as the source of all other rivers, of every sea, and even of springs. (*Il.* xxi. 196.) Apparently all water gushing out of the ground was imagined to come by a subterranean sluice from the Ocean. There may have been a confusion here between the River and the River-god: as a deity, Ocean was one of the older vaguely defined Nature-powers which the Greeks brought with them from their Aryan homes, but which gradually disappeared before the later and brighter gods of Olympus.

For a long time after Homer's date we find references in the poets to the river Ocean. Thus Mimnermus (B.C. 620) describes, in an interesting fragment, the Sun's homeward journey by night from west to east along the stream of Ocean. After compassionating the god for his unceasing daily toil, ever renewed as soon as the rose-fingered Dawn rises from the Ocean, he continues—

For him through the billowy wave, just skimming the face of the water,
Beareth a pleasant couch all wrought by the hands of Hephaestus,
Hollow, of precious gold, that had wings through the craft of the artist,
Wafting the sleeping god from the land of the Maids of the Evening,
Swift to the Æthiop shore where his chariot and horses are standing.

A similar account is given by the poet Stesichorus (of the same date) in a stanza remarkable in the original for its stately rhythm:—

Lightly the Sun-god was stepping, the radiant child of Hyperion,
Down into the golden bowl, to be swept by the current of Ocean
Back to the sacred depths of Night, where in murky recesses
Mother and wedded wife and darling children await him.

When we come down to the great dramatists of the fifth century before Christ, we find this conception of Ocean still prevalent. Aeschylus, indeed, introduces him as one of the characters in the *Prometheus Bound*, and describes him as "Father Oceanus that rolls round the whole earth with un-sleeping stream." Euripides, again, in the lost play of *Phaethon* has the lines—

And on the springs of Ocean
The honey-voiced swan is fluting.

But the notion had been already ridiculed by Herodotus, and slowly disappeared as geographical knowledge advanced. It is hard to say how it had originated. If we must guess, it would be reasonable to suppose that it arose from some old mythological conception.

Styx, Acheron, Cocytus, Phlegethon.—These are the celebrated rivers of the Kingdom of the Dead or Under World, and may be grouped together in contradistinction to Lethe—a fifth stream added very much later. The four were practically looked upon as different branches or feeders of one subterranean water, which is as often called a lake or pool as a river. In Greek and Latin poetry the four names are used with extreme freedom, and almost as interchangeable with each other. It would be the height of pedantry to expect in the shifting fancies of poets the kind of exactness which is appropriate in a gazetteer. Only a general consistency need be looked for.

Let us now attempt to trace historically the growth of the popular legends connected with these names.

When we begin with the *Iliad* we are struck by the fact that the Styx is the only one of the four which is named, and it is only in one passage (*Il.* viii. 369) that it is at all implied that it was connected with Hades. Were it not for that solitary reference, the Styx of the *Iliad* would be almost exclusively the Oath-river—the most awful object by which the gods could swear. There is little doubt that this stream was originally the actual Styx of Arcadia.* This is a well,

* Cf. Leake's *Travels in the Morea* (ed. 1830). Col. Leake visited the Morea in 1805, and on the 2nd April thus describes his approach to the Styx (from Solos, which is near the ancient Nonacris), vol. iii. p. 160;—"The mountains exhibit a sublime but dismal scene. Their barren sides are furrowed by numberless torrents, contributing to form the rapid muddy stream which roars over the rocks below Solos. (He refers to the river formed by the junction of the Styx and Crathis). Above the Klukines (villages so called) this torrent descends rapidly through a deep rocky glen, at the upper extremity of which the eastern part of the great summit of Khelmos (7,726 feet high) terminates in an immense precipice. Two slender cascades of water fall perpendicularly over the precipice, and after winding for some distance among a labyrinth of rocks, unite to form a torrent, which after passing the Klukines, joins the river Akrata (the ancient Crathis). The people of Solos say that it is impossible to arrive at the water at the foot of the precipice, which is true at present on account of the snow, and may possibly be equally so in summer by reason of the nature of the ground."

Col. Leake then expresses his belief that this cascade is the Styx of Homer, and even lies at the bottom of Hesiod's mixture of fact and mythology.

Again, on p. 162 he continues:—"The reputed poisonous quality of the Stygian water, as well as the other fables told of it by the later Greeks, arose very naturally among a superstitious people from its inaccessible position and the veneration in which, during so many centuries, it has been held. Theophrastus says that those who wished to take the water made use of sponges, because it destroyed all kinds of vessels except those of horn, and that all persons who tasted of the water died. I can find no person at Solos, not even the Didascalus, who is scholar enough to be sensible that he is living on the banks of the Styx; but what is very curious, though ignorant in this respect, they preserve the old notion that the water is unwholesome, and relate nearly the same story concerning it as

or rather two springs of icy coldness which fall down the face of a high precipice, and then run in a gloomy ravine of great depth and savage wildness. The name Styx—the Hateful, seems first to have been given to it from the deadly chill experienced after drinking it: the Greek peasants to the present day consider it unwholesome. Why it was selected as the most formidable object of an oath we cannot tell. Although the author of the *Iliad* had probably never been in Arcadia, he describes the Styx with great accuracy. Thus it is always the “water Styx,” never a river; it is the downward trickling (καταβόμενον), or the sheer-falling streams (αἰπὰ ῥέεθρα). The Styx so far has no special connection with the dead. But in the *Iliad* there is one solitary allusion to the belief which afterwards became an unquestioned article of faith among the Greeks down to the latest days of paganism—the notion that the souls of the dead had to cross a river, and

Pausanias, saying that no vessel will hold the water; which indeed they may very safely affirm, as well as all the other fables repeated by the ancients, if it is inaccessible, as they assert. They seem also, equally with the ancients, to have neglected the consideration, that if the Styx is a pernicious water, the stream below Solos ought to partake of the same quality, which has not been pretended either by ancients or moderns. The cascade is called τὰ Μαυρα-νέρια (the black waters), and sometimes τὰ Δρακο-νέρια (the terrible waters). In summer, when the stream is scanty and the wind high, they describe the cascade as blown about like a torrent from a mill. The superstitious respect in which the present inhabitants hold the Styx is probably the effect of tradition, supported by the causes which had originally produced the same influence on their still more superstitious ancestors—such as the wildness of the surrounding scenery, the singularity of the water-fall (which, though it might not obtain much fame in the Alps, is higher than any other in Greece) and its inaccessible position. In a rude state of society, such situations are often the fabled residences of the personified objects of worship, whose supposed presence added to the terrors of the scene would render an oath there taken more solemn and its obligation more binding.” He adds that, according to Herodotus, the Arcadians used to meet in his time at the Styx to take the oath of the Confederacy. As the only Pelasgian tribe in Peloponnese, they may have retained an old Pelasgian superstition which was taken up by their imaginative Hellenic neighbours.

were not able to do so till buried. In *Iliad*, xxiii. 71, the ghost of the slain Patroclus appears to Achilles and thus addresses him:—

Bury me, friend, at once—so cross I the threshold of Hades,
Back do the souls of the dead now thrust me, the bodiless shadows;
Nor may I join the troop across the streams of the river,
But ever I wander in vain through the wide-gated regions of darkness.

It was this mysterious river, which is here unnamed, that the usage of later ages called Styx, or Acheron, or Cocytus. When we pass on to the *Odyssey* we find ourselves in a poem which most critics consider to be about a century later than the *Iliad*. We have amongst other adventures of the hero, Ulysses, a visit to the dead, or rather to a spot on the confines of the lower world, to which the Shades could be attracted by the performance of certain sacrificial rites. The account of Hades which follows is shadowy in the extreme, and inconsistent in its details. The noblest lines which describe the tortures of Tantalus and Sisyphus are admitted to be interpolations due to later rhapsodists. Great uncertainty prevails about the geography of the Homeric Shadow-land. Throughout the eleventh book no rivers are mentioned at all, but in the tenth, when the Goddess Circe is instructing Ulysses where to go for his interview with the dead Prophet Teiresias, the names of three infernal streams are introduced for the only time in the whole Homeric writings with an abruptness which, to say the least, is startling. He is told to beach his ship on the further shore of the "deep-eddying" ocean stream at a place where poplars and willows form a grove sacred to Proserpine, and

Where into Acheron flows the Phlegethon's flame-rolling billows
And the Cocytus sad—a branch of the Stygian water;
And where at the foot of the crag the roaring water-falls mingle.*

*Of the names thus suddenly introduced, Cocytus means *Wailing*; Phlegethon (in Homer Pyriphlegethon), *Fire-blazing*; Acheron is doubtful, though Liddell and Scott still adhere to the traditional *River of Woe*.

The landscape here sketched in the merest outline is nevertheless a distinct reminiscence of the Arcadian precipice, the two cascades and the ravine at the bottom.

Hesiod (B.C. 850-800 approximately) gives us a singularly wild picture of Styx, which combines in a surprising manner her attributes as a terrible infernal deity, the eldest daughter of Ocean, with the physical features of the oath-stream. The goddess, hateful to the other immortals, sits in a separate dwelling, roofed with the living rock and supported by silver pillars. It is only rarely that Iris, the messenger of the gods, comes to visit her, whenever a strife has arisen in Olympus, and the administration of an oath is necessary. The celestial messenger then descends to fetch in a golden cup some of the "famous cold water, which pours down from the lofty precipitous rock, the imperishable primeval water of the Styx, which it pours forth through a rugged country."

It is not necessary to trace every variation in these fables from the time of Homer down to the age of Pericles. Indeed, it is not possible to do so with completeness, as the splendid body of Greek lyric poetry has come down to us only in fragments, with the exception of Pindar. It is, therefore, with some consciousness of surprise that we discover the legends of the Rivers of the Dead in so distinct a form in the writers of the fifth century. It was now firmly established that the souls of the dead had to cross a river, known indifferently as the Styx or Acheron, and often represented as a lake. Across this water they were ferried by a god, Charon, who enjoyed a green and vigorous old age; as his fare he received a small coin, which was invariably placed beneath the tongue of the corpse. If the body were unburied, Charon repelled the would-be passenger, and the rejected spirit was obliged to wander about for a time, generally stated as a hundred years. We have seen the first traces of this belief in the petition of Patroclus in the 23rd book of the *Iliad*, but the god Charon and his boat are entirely new features. When once intro-

duced, however, they meet us everywhere. Alcestis, in the touching play of Euripides, as she draws near her end, exclaims wildly—"I see it, I see it, the two-oared skiff; and Charon, the ferryman of the dead, resting with his hand upon his pole, is calling me already." Aristophanes, again, in the *Frogs*, makes the god Dionysus cross the water in his burlesque descent to Hades, but his comic servant, Xanthias (as he is a man, and has not yet died) is not allowed to enter the boat, and is obliged to run round the lake. In the more fanciful parts of Plato (the so-called myths), as in the *Phædo*, the souls are represented as arriving at the shores of the Acherusian lake.

Whence arose this singular and firmly planted notion, almost unknown to the older literature of the Greeks, and ever gaining in distinctness and popularity? There seems little reason to doubt that it came from Egypt, as the ancients themselves asserted. Herodotus and Diodorus both maintained in the most positive manner that Greek mythology had been deeply influenced by Egyptian. Even if we make allowance for some exaggeration, we have sufficient grounds to believe that the imposing and mysterious ritual of Egypt exercised a strange fascination over the light-hearted Greeks. Nor should we forget that the East had much to teach to the West. Behind the awful and grotesque forms of symbolical monsters, under the strange disguise of weird characters, in the fantastic frescoes which lit up the deep shade of the colossal pillar-crowded temple-courts, there lay buried an inner doctrine of solemn import. It seems abundantly clear from the evidence of monuments and papyrus-rolls that the Egyptian priests held very distinct ideas about the immortality of the soul and a future state. "After death the judgment," was a conclusion to which they seem to have been early led. In the sacred rolls found in all the tombs of importance that have not been rifled, we read an elaborate account of this future judgment. Osiris is the Judge. Before coming

into his presence the soul has to be ferried across a sacred lake. The steersman of the spirit-boat is the god Horus. The soul then stands before its judge, and is accused by two and forty genii; its good and evil actions are then weighed in the balance against the standard of Truth or Righteousness, and sentence is given accordingly. Moreover, in the funeral ceremonies of Egyptians of the highest rank it was customary to have a kind of dramatic rehearsal of this awful scene, in which the corpse represented, as it were, the soul. In each nome or province of Egypt there was a sacred lake intended to be the symbol of that of the lower world. When the funeral procession reached the shores of this lake, the coffin was placed on the *baris* or sacred boat made of the stalks of the papyrus (hence the learned Virgil borrows his "woven boat," *sutilis cymba*—*Æneid*, vi. 414). Forty-two judges meanwhile were assembled around the mummy-case to pass sentence on the dead man. Any person might come forward as *Advocatus Diaboli*, and bring charges against the moral character of the deceased, and if he succeeded in proving them, the corpse was not allowed to cross the lake, but had to be buried on the shore. Here we certainly seem to have the original facts which so deeply impressed the active imagination of the Greeks. We see why the Acheron or Styx is often called a lake, and why there was the necessity, never explained in Greek mythology, for crossing it. Horus is transformed into Charon. Osiris reappears as Rhadamanthus, who actually bears in his name traces of his Egyptian origin, as Amenti is the Egyptian equivalent for Hades. Cerberus is borrowed from a demon, with the head of a hippopotamus, which guarded the Kingdom of the Dead, the Greek sense of proportion changing a hideous symbol into a picturesque monster. Phlegethon probably took its rise from the terrific description of streams of fire in the place or future torrents, as described in the Ritual of the Dead, and the Egyptian etymology for Elysium, i.e., *Aahlu*, seems the best explanation of that word. In litera-

ture, incomparably the finest portraiture of Charon is in the *Inferno* of Dante. It is true that he has followed Virgil in details, but what vigour, above all, what terrible earnestness has he breathed into the classical tradition! Virgil's account of the Lower World is picturesque, and set off by all the beauty of a stately language in the hands of a consummate artist. But the reader always doubts his sincerity, always suspects that he is treating his subject mainly as an opportunity for poetical display. Thus, his earlier account of Tartarus is quite inconsistent with the doctrine of Metempsychosis in the later part of the book. Perhaps he did not care which was true, if only he could make good verses out of them. Dante, on the contrary, has no shadow of doubt about his own creed, and hence he gives his fictitious incidents the intense reality of his own deep feeling.

Let us conclude our notice of Charon and his stream with the vivid episode introduced in the 3rd canto of the *Inferno* (Carey's translation):—

Then with eyes downward cast, and filled with shame,
Fearing my words offensive to his ear,
Till we had reached the river, I from speech
Abstained. And lo! toward us in a bark
Comes on an old man, hoary white with eld,
Crying, "Woe to you, wicked spirits! hope not
Ever to see the sky again. I come
To take you to the other shore across,
Into eternal darkness, there to dwell
In fierce heat and in ice. And thou, who there
Standest, live spirit! get thee hence, and leave
Those who are dead." But soon as he beheld
I left them not, "By other way," said he,
"By other haven shalt thou come to shore,
Not by this passage; thee a nimbler boat
Must carry." Then to him thus spoke my guide:
"Charon! thyself torment not; so 'tis willed,
Where will and power are one: ask thou no more."
Straightway in silence fell the shaggy cheeks
Of him, the boatman o'er the livid lake,

Around whose eyes glared wheeling flames. Meanwhile
Those spirits, faint and naked, colour changed,
And gnashed their teeth, soon as the cruel words
They heard. God and their parents they blasphemed,
The human kind, the place, the time, and seed
That did engender them and give them birth;
Then all together sorely wailing drew
To the curst strand, that every man must pass
Who fears not God. Charon, demoniac form,
With eyes of burning coal, collects them all
Beckoning, and each that lingers with his oar
Strikes. As fall off the light autumnal leaves,
One still another following, till the bough
Strews all its honours on the earth beneath,
E'en in like manner Adam's evil brood
Cast themselves, one by one, down from the shore,
Each at a beck, as falcon at his call—
Thus go they over through the umbered wave.

Lethe.—There is great obscurity about the first introduction of this name into the cycle of Greek mythology. One would like to have supposed that the notion sprang up spontaneously in the human mind, and that it gave expression to the deep yearning of the sinful soul for oblivion of the past, for the complete blotting out of the old accusing record. Or again, one might conjecture that it was appropriate to “the land of forgetfulness, where all things are forgotten.” But our only safe course is to follow the historical method, and disregard our own subjective prepossessions. In Greek literature Lethe appears late, being unknown to Homer, Pindar, and the great dramatists. It is in Plato that we seem to have the first approximation to the notion, and oddly enough he gives it another name. It occurs in the famous allegory at the end of the Republic, in which he attempts to combine the Pythagorean doctrine of the transmigration of souls with a system of rewards and punishments after death. Er, the son of Armenius, a Pamphylian (conjectured to be Zoroaster), is supposed to have been in the world of spirits for ten days, and to be allowed by the Destinies to report what he had

seen to his fellowmen. Amongst other things he had observed vast multitudes of souls which were fated to undergo a second birth. These spirits, which were on the eve of entering upon a fresh cycle of existence, were brought into the Plain of Forgetfulness (*τὸ τῆς Ἀλήθειας πεδίον*) and encamped for the night by the stream of Unmindfulness* (*Ἀμειλῆς*), of which they took copious draughts. For whosoever drinks of the water of this river, which no vessel can hold,

Forthwith his former being and state forgets—
Forgets both joy and grief, pleasure and pain.

At midnight there was a storm of thunder and lightning, and the souls darted along the sky, like shooting stars on their way to a fresh birth.

It may be fairly inferred from the facts given above, that the River Lethe is not due to any popular notion of native origin, but is rather the offspring of philosophical speculation. Indeed, it is obvious that if the theory of metempsychosis be accepted, some process of oblivion must be imagined between two successive stages of existence.

Curious as is the idea of the successive births of the same soul in various forms of life, and incapable of proof as it must always be, it seems to have been common to many old religions. It may have arisen independently in Egypt and in India. It is still a dogma of Brahminism and Buddhism. In both these religions the highest reward in a future state is exemption from the necessity of a new birth. The pious Brahmin believes that this end will be gained by the re-absorption of his individual soul into the Universal Soul of the world. The pious Buddhist imagines that his bliss will be secured when the flame of his life is blown out, and not relighted at death; in plainer words, by the total extinction of personality. It is hardly likely that Pythagoras, from whom Plato borrowed the doctrine, was at all influenced by Indian

* Jowett's translation.

ideas. There seems no reason to doubt the assertion of the ancients that he derived it from Egypt. The Greeks had a much greater tendency to mysticism than is usually allowed, as is sufficiently proved by the popularity of the ascetic Pythagorean brotherhood. An interesting glance at this unfamiliar aspect of the Greek mind is given us by a fragment of a philosophical poem by Empedocles. In this it is said that "it is an ancient eternal decree of the gods, confirmed by mighty oaths, that when any one has defiled his limbs with slaughter, he must needs wander 30,000 years* away from the blessed ones, being born in all kinds of forms. For the air chases him to the sea, and the sea spits him out to the land, and the land to the heavens and the unwearied sun, and he plunges him in the eddies of the æther, and one receives him from another, and all abhor him." Again, in another fragment he says plainly :—

Once already have I been a lad, and a lass,
And a tree, and a bird, and a dumb fish in the sea.

Such, then, seems to have been the origin of Lethe, and it now remains to consider its treatment in literature. As already stated, the great Greek writers are silent about it, and it is in Virgil that we find it employed for the first time in an effective manner. We have already alluded to the vivid colouring of the Virgilian Hades, in comparison with the shadowy outlines of the sketch in the *Odyssey*. Probably the most original part of Virgil's Unseen World is his account of Lethe. Æneas has gone down to the Kingdom of the Dead to consult his father, Anchises. After many adventures he finds him in a secluded valley watching the

* Herodotus in his account of Egypt (book ii. 123) says that the Egyptians were the first to assert the immortality of the soul. They supposed that at death the soul entered into another living being which happened to be born at that very moment, and that in this way it passed through all creatures, on land, and in the sea, and in the air, in the course of 3,000 years, and then once more returned to a human form.

souls of those who were waiting a second birth. We will quote the passage from Conington's translation :—

Meantime Æneas in the vale,
 A sheltered forest sees,
 Deep woodlands, where the evening gale
 Goes whispering through the trees ;
 And Lethe river, which flows by
 Those dwellings of tranquillity.
 Nations and tribes, in countless ranks
 Were crowding to its verdant banks :
 As bees afield in summer clear
 Beset the flowerets far and near,
 And round the fair white lilies pour :
 The deep hum sounds the champaign o'er.
 Æneas, startled at the scene,
 Asks, wondering what the noise may mean,
 What river this, or what the throng
 That crowds so thick its banks along ?
 His sire replies : " The souls are they
 Whom Fate will reunite to clay :
 There, stooping down on Lethe's brink
 A deep oblivious draught they drink."

When the hero asks in natural amazement what can induce any souls, once delivered from the sorrow and burden of life, to return to mortal bodies, his father in reply gives a brilliant summary of pantheistic theology. Human souls are portions of one all-pervading spirit. After death they suffer purgatorial pains according to the amount of pollution necessarily contracted during their sojourn in clay. When all stains have been cleansed, they are prepared to return to the Upper World.

All these, when centuries ten times told
 The wheel of destiny have rolled,
 The voice divine from far and wide
 Calls up to Lethe's river-side,
 That earthward they may pass once more,
 Remembering not the things before,
 And with a blind propension yearn
 To fleshly bodies to return.

Very different is the use made of Lethe by Dante, who

could, of course, find no place for pantheistic reveries in his Christian Epic. In the 27th canto of the *Purgatorio* the poet, after climbing up the seven rocky terraces or cornices of the Mountain of Purgatory, reaches a pleasant table-land of delightful forest-scenery on its top. This is the Garden of Eden, once occupied by Adam and Eve. As the poet breathes the delicious air and listens to the songs of birds he sees a stream—

When, behold ! my path
Was bounded by a rill, which, to the left,
With little rippling waters bent the grass
That issued from its brink. On earth no wave,
How clean soe'er, that would not seem to have
Some mixture in itself, compared with this,
Transpicious clear ; yet darkly on it rolled,
Darkly beneath perpetual gloom, which ne'er
Admits or sun or moon-light there to shine.

On the other side of this stream appears a beautiful maiden culling flowers, who informs him that this is Lethe:—

The water thou behold'st, springs not from vein,
Restored by vapour, that the cold converts ;
As stream that intermittently repairs
And spends his pulse of life ; but issues forth
From fountain, solid, undecaying, sure :
And, by the will omnific, full supply
Feeds whatsoe'er on either side it pours ;
On this, devolved with power to take away
Remembrance of offence ; on that to bring
Remembrance back of every good deed done
From whence its name of Lethe on this part ;
On the other, Eunoe—both of which must first
Be tasted, ere it work ; the last exceeding
All flavours else.

Dante has here imparted a profound theological meaning to the old pagan symbols. In his system Purgatory represents the cleansing of penitent souls after death. When they arrive at the top of the mountain their corrective pangs are over, and they are ready to wing their flight to a happier

sphere. What, then, more natural than that they should drink oblivion of their former sins? What more graceful than the addition made by Dante, that they should, at the same time, recover recollection of their good deeds?

With these two great predecessors before him it was difficult indeed for Milton to show any novelty in his treatment of Lethe. And yet he has done so, though it may be questioned whether his austere severity contrasts favourably with the more merciful dogma of the mediæval church. He introduces the River of Oblivion to aggravate the tortures of the lost. At certain seasons, we are told, the spirits of the damned are haled by harpy-footed Furies from one scene of torment to another. On their way they pass over the "Lethæan sound," and, as they are hurried across it, they strive in vain to reach the magic waters, to enjoy one moment's respite from the scourge of an accusing memory. A wonderful picture is presented us of this ghastly procession sweeping over the broad stream, with hands outstretched in vain longing, and faces wan with eternal despair, that

Wish and struggle as they pass to reach
The tempting stream, with one small drop to lose
In sweet forgetfulness all pain and woe,
All in one moment and so near the brink,
But Fate withstands.

River of Death in Christian Allegory.—To our minds the comparison of Death to a river separating us from the unseen world, has been rendered so familiar by well-known hymns, that it requires an effort on our part to realise its modern character. This conception is a very different thing from the mythical rivers of which we have been treating, although there is a superficial resemblance between them. The fundamental contrast, however, lies in this, that in the case of the ancients the Styx has to be crossed *after death*, while in our popular metaphor the crossing the river is the *act of death*. Classical antiquity sometimes compared death to a voyage which ends

in Hades (Epigrams), and life to a similar journey, as when Marcus Aurelius* says—"You embarked, you had your sail, you have come to land: get out." But the act of death is never compared to crossing a river. Nor is it a scriptural image; both in the Old and New Testaments the favourite metaphor for death is sleep. At the same time so obvious an idea might well have taken its rise in the allegorising school of commentators, when the Desert became the type of human life, and the Promised Land that of Heaven. Be that as it may, it is probable that the notion has entered modern religious language, mainly through the famous allegory of John Bunyan. What reader of the immortal *Pilgrim's Progress* can forget the noble end of the eventful journey?

"So I saw in my dream that they went on together till they came in sight of the gate. Now, I further saw that betwixt them and the gate was a river, but there was no bridge to go over, and the river was very deep. At the sight, therefore, of this river, the pilgrims were much stunned; but the men that went with them said: You must go through, or you cannot come to the gate."

Dr. Bonar has expressed a similar thought in the following lines:—

Oh help me o'er this river,
Thou who hast crossed before;
Oh help, or I shall never
Reach the further shore.

Its waters swell and eddy;
I fall, I sink, I'm lost:
Oh keep my footsteps steady,
Till I have safely crossed.

Stretch out Thy hand to save me,
As Thou hast often done;
For if Thou wilt not have me,
Then I am wholly gone.

* *Meditations*, iii. 3.

CHAPTER VII.

ANIMAL AND VEGETABLE LIFE OF RIVERS.

All day thy wings have fanned,
At that far height, the cold thin atmosphere;
Yet stoop not, weary, to the welcome land,
Though the dark night is near.

And soon that toil shall end,
Soon shalt thou find a summer home, and rest,
And scream among thy fellows ; reeds shall bend
Soon o'er thy sheltered nest.

—*Bryant's Address to a Waterfowl.*

It is hardly possible to dissociate from rivers the animals and plants which are adapted to them, and form their principal charm to man. What would a stream be if no fish leapt up from its smooth surface, if no water-fowl rose noisily from its reed-beds, if no willows, or poplars, or alders lined its banks? It must, however, be understood at the outset that we cannot here draw a sharp line between lakes and streams, as nature recognises no essential distinction between flowing and standing water. It must, therefore, be considered as partly accidental if any individual form of life, whether animal or vegetable, is at present confined to the lake or the stream. With this proviso we may proceed to discuss the more characteristic kinds of the aquatic world.

It is to the Tropics that we naturally turn first, as it is there that all life is most fully represented. Two of the river-animals are so extraordinary that they have attracted attention from the earliest times. In the Book of Job the Hippopotamus and Crocodile are described at some length

under the names of Behemoth and Leviathan respectively. The later chapters of that most interesting book form one of the oldest treatises on Natural Theology extant. It is remarkable that the inspired writer looks upon nature from a more scientific point of view than the comparatively modern Cicero. He does not make the mistake of considering that the animal creation exists solely for man's benefit. On the contrary, he rises to a far higher level of thought, and describes it as showing indications of Divine Wisdom and Power. Thus, with reference to the Hippopotamus, he glories in dwelling upon the mighty bulk of the huge water-beast; "his bones are like bars of iron; he moveth his tail like a cedar." He dwells with pleasure upon his noon-tide rest: "He lieth under the shady trees, in the covert of the reed and fens. The shady trees cover him with their shadow; the willows of the brook compass him about." Similarly in the account of the Crocodile, the poet dilates with sympathetic exultation upon his fierceness: "None is so fierce that dare stir him up. Wilt thou play with him as with a bird?" His violent snorting, his strong pieces of shields (a piece of literalism which betrays the observer, obscured in our authorised version by "scales," but correctly given in the margin), his track in the Nile water: "He maketh a path to shine after him; one would think the deep to be hoary," are all presented with great force and vividness.

The Hippopotamus, or river-horse, might well excite amazement. As far as systematic zoology goes, it is most nearly related to the pig, but popular instinct was not far wrong in connecting it with the horse, as is done by Herodotus who uses the original and correct form *Hippos potamios*. It is a huge ungulate of nocturnal habits, feeding almost exclusively on vegetable matter. At present it is confined to Africa, but the genus was formerly spread over Europe, Asia, and America. It begins to appear in Nubia, and is then common in all the large rivers south of the Equator. Its especial

function in Nature would seem to be to clear out the excessive masses of vegetable growth that would otherwise block up tropical water-courses. Where unvarying heat and moisture are combined, there is scarcely any limit to the luxuriance of aquatic plants in the shallower parts of a great stream. Sir Samuel Baker says of the Upper Nile, that it is sometimes almost impassable from the unbroken mass of reeds, rushes, and water-flags. This exuberance is wholesomely checked by the vast appetite of the river-horse. Unwieldy as he is on land, he has the appearance of great buoyancy in the water. In the Lower Nile they have been nearly exterminated, as they are killed for their useful hides and the valuable ivory of their teeth. The river-horse was among the strange animals which Imperial luxury assembled at Rome for the sports of the circus. In the Tertiary period this huge form of mammalian life flourished in what is now England, but what was then a westerly prolongation of the Continent. Although not now found in America, where the vast net-work of the Amazon system seems formed for it, the river-horse formerly abounded in the Northern half of that Continent, its bones being abundant in the so-called Bad Lands in the great desert at the foot of the Rocky Mountains.

The second great animal of tropical rivers is the Crocodile of the Old World, and the nearly allied Alligator of the New. "Monstrous efts" of amphibious habits, they remind us of the age of the Lias, when the still more formidable *Ichtyosauri* and *Plesiosauri* were the tyrants of the deep. They are the largest of living reptiles, and are plainly dependent upon an unlimited supply of fish, the excessive multiplication of which they help to check. The best-known species are the historical Crocodile of the Nile (*Crocodilus vulgaris*), the Gavial of the Ganges and other Indian rivers (*Gavialis Gangeticus*), the common Alligator of the Southern States of North America, the Caiman (*Alligator palpebrosus*) of Guiana, and the Jacaré (*Alligator sclerops*) of Brazil. Most of these huge saurians are

nocturnal in their habits, and feed on fish, birds, or small mammals which they can manage to capture. In the day-time they are a familiar sight in the great rivers of the Tropics, lying like logs on mud-banks in the full blaze of the sun, which suits their slow circulation.

The Crocodile of the Nile is a valuable scavenger, as he even prefers tainted carcases. Whilst some are dangerous to man, others, as the Jacaré, are scarcely ever known to attack him. Remains of crocodiles are abundant on British soil, as at Sheppey Island, and date from the Tertiary epoch. Since the discovery has been made that alligators' skins make splendid leather, our American cousins are likely to exterminate that creature before long in the quiet lagoons of Florida and Louisiana. But the large saurians do not bear unchallenged sway in fresh water. Many of the tortoises are nearly as formidable, whilst clothed themselves in impenetrable armour. They are admirable swimmers. They leave the water at night, and climb up upon islets, rocks, or fallen tree-trunks, but the least noise of man sends them back to their favourite element. Of these, the Alligator Terrapin, is a dangerous animal, with jaws so sharp and strong as to cut like steel shears; the Matamata has some of the most grotesque trappings of any forms in the present world, comparable only to those of some insects; the Snapping Turtle (*Trionyx ferox*), is much dreaded by man from the severity of the wounds it inflicts. Many of these singular animals devour young alligators as well as fish.

There is still another dangerous creature which haunts the still waters of tropical rivers, the Anaconda (*Eunectes murinus*). This immense serpent is accustomed to hang from a tree by one or two coils of its powerful tail, and thus to float quietly amid the reeds and other vegetation of the water-side. The moment, however, a small animal comes to the bank to drink, the huge creature darts like lightning upon him, and the sluggish pools are lashed into fury by his

writhing folds as they secure the victim. But the traveller will occasionally see a mild and gentle creature which haunts the tidal portion of the rivers of Guiana and Brazil. This is the Manatee (*Manatus australis*), at first sight a large seal, but sharply distinguished from those carnivorous animals by its herbivorous diet. They are said to have been once abundant at the mouths of the Orinoco and Amazon, and even to have penetrated a long way up their streams, and into their vast tributaries and lagoons. As they have pectoral mammae, and are often seen suckling their young, they together with their nearest relative, the Dugong of the Red Sea, have the best right to be the basis of fact upon which are founded sailors' stories about mermaids. The Portuguese and Spaniards call them woman-fish, whereas the Dutch call the Dugong Baardmannelje, or Little Bearded Man.

Among the smaller denizens of rivers two are of considerable interest—the Beaver and the Otter. The Beaver in Europe and Asia is only known to live in an isolated condition, but the variety found in North America is famous for its social propensities. These ingenious rodents build dams across the rivers near which they live. In the construction of these they gnaw through the stems of comparatively large trees with their sharp teeth, break off and weave together the branches, and plaster the whole structure with mud thrown on by their flat scaly tails. After thus making a pond of their own, they further proceed to build "lodges," or houses. It appears that their food consists principally of leaves, herbage, and bark, and not, as popularly supposed, of fish. A strong beaver-dam will occasionally block up a small stream. Lord Milton and Cheadle, in their journey across the Rocky Mountains, thus describes what they saw (*North-West Passage by Land*, p. 175, cheap edition):—"On the way we frequently met with marks of the labours of the beaver in days long gone by, when they were a numerous and powerful race; and at one place we found a long chain of marshes,

formed by the damming up of a stream which had now ceased to exist. Their dwelling had been abandoned ages ago, for the house had become a grassy mound on the dry land, and the dam in front a green and solid bank."

No apology, surely, is needed for adding the following extract:—"On Dog River, a small tributary of the Saskatchewan, a colony of these animals still survived. We found fresh tracks along the banks, and a few small trees cut down; and following these indications up the stream, we came upon the dam. This was a weir of trunks and branches, over which the water poured gently to resume a more rapid course below. In the quiet pool above, and close to the opposite bank, stood the beaver house, a conical structure of six or seven feet in height, formed of poles and branches plastered over with mud. . . . None of the inmates were visible. . . . We saw stumps of trees which had been cut down by them, now moss-grown and rotten. Some of these were of large size, one measuring more than two feet in diameter. . . . The trees cut down more lately were all comparatively small. . . . Nor did we even discover any considerable stream dammed up by beaver of this present time—a work requiring large timber and numerous workmen; yet we frequently met with the grass-grown banks described, works of the golden age gone by, stretched across what had been streams of thirty or forty yards in width."

The Otter is remarkable for its skill in diving and swimming, its ferocity, and the terrible havoc it makes among salmon and other fish. It is the true wolf of the river banks, as it destroys far more fish than it requires for its own nourishment. This mischievous vermin has almost disappeared from England, where, perhaps, its survival can only be excused in the dearth of wild animals which is the result of civilisation. The tapir—a singular link between the elephant and swine, haunts the banks of South American rivers, and is a good swimmer and diver. But he can hardly be considered a

water-beast, as his food is chiefly vegetable, and his regular home the forest.

But, after all, the sportsman or traveller who explores river scenery will only occasionally come across the larger mammals or reptiles; his most constant companions will be the birds above the surface and the fish below. The great broad rivers of equatorial South America, expanding in lake-like reaches between green walls of forest, and fringed with countless natural canals, breakwaters, and lagoons, are the paradise of water-fowl. It is impossible to attempt to describe the animation given to these tranquil scenes by the countless flocks of large and beautiful birds, constantly rising into the air and settling again with mingled cries of pleasure and alarm. We can only mention some of the more remarkable forms found over the world. Conspicuous from size are the Cranes, Storks, and Herons, clad usually in sober liveries, but sometimes, as in the Egret, resplendent in snow-white plumage with creamy yellow trains. Almost cosmopolitan are the various kinds of Ducks breasting the waves; wild Geese and the majestic Swan are more confined to temperate latitudes. Perhaps few zoological surprises were ever greater than the discovery of the Black Swan in 1698 in Australia, followed up by that of the Black-necked Swan. Glorious in colour are the various species of Ibis, some a flaming red, as in America, others white, with beautiful metallic shades. The grotesque Flamingo, with its gaudy scarlet; the Pelican, with its enlarged pouch; the greedy Cormorant, flying heavily along about a foot above the water—all are associated more or less with rivers. Among other singular forms may be mentioned the Darter (*Plotus anhinga*), found in Florida. Its long neck is so snake-like that it is commonly called the snake-bird, and it forcibly reminds a student of geology of the Plesiosaurus. They are indefatigable rs, but the most singular point about them is their habit mming with the whole body submerged except the long

neck. Eye-witnesses assert that those who have seen this long neck issuing from the water, and twisting and writhing and wriggling amongst the herbage, might well believe it to be a snake. The Jacana, too (*Parra jacana*), is well worth a separate notice. One of the long-legged waders, it has developed toes of such dimensions as to enable it to walk upon the floating leaves of water-lilies. We must pass by Widgeons, Teals, Water-hens, Screamers, and the many kinds of sea-fowl which frequent the estuaries of large streams, and give such cheerfulness to the strand by their cries. But of all the animal creation, the teeming multitude of fish is the most important population of fresh as well as of salt water. For it is the inexhaustible supply of fish which supports the ravenous Alligators, the Otters, the Cormorants, and Pelicans. Inexhaustible, we repeat, where the water is in a natural state, not poisoned by liquid manure or chemical refuse. To the followers of the blameless Walton a river is mainly the place where trout and salmon and dace are to be caught. The literature of angling is very extensive, so that it is here unnecessary to do more than touch lightly on the more remarkable kinds of fish. The fresh-water giant is one of the species of Sturgeon. These, with a few other genera, belong to the order named Ganoids, which are mainly interesting as dwindling representatives of a once powerful clan. In earlier geological epochs this group, distinguished by its armour of bony plates, abounded in seas and rivers. Some of the most singular forms were discovered and eloquently described by Hugh Miller in his work on *The Old Red Sandstone*. Besides the sturgeons, the chief other survivals of this class are the *Polypterus*, a remarkable form found in the Nile and Senegal, and the bony Pike (*Lepidosteus*) of North America; although some zoologists are inclined to add to them the "Barramunda" (*Ceratodus*) of Australia, and the *Lepidosiren* of Africa and South America. Sturgeons are chiefly caught when ascending the great rivers of the Black and North

Seas in their annual migration. To the Russians they are invaluable as an abundant source of good food, and also of the useful article isinglass, and the delicious luxury caviar, now more generally appreciated than in Shakspeare's time. One of the species runs to ten or twelve feet in length; but the smallest, the Sterlet, has the highest reputation for the table. The most valuable, however, of fresh-water fish is, by common consent, the Salmon. It is a matter of notoriety what a source of profit a few miles of a salmon river are in Scotland. In North America it is prodigiously abundant. When we remember the immense skill and ingenuity lavished by civilised man upon his fishing tackle, landing gear, and so on, it is well to remember as a useful corrective that savages are able to catch fish with the rudest implements, and even to shoot them with primitive bows and arrows.

Vegetation of Rivers.—When we pass on to the vegetable world we recognise another of the powerful charms which attract us to the river's brink. Even the simple fringe of tall-flowering grasses, stately bulrushes, fresh green reeds and sedges and flags, lighted up here and there with the grand spikes of the Purple Loose-strife, the rich clustering golden blooms of the Yellow Loose-strife and the angular flowers of the Iris form a delicious framework to our English streams. But floating on the water itself are floral forms which deservedly rank among the noblest of all, the water-lilies and their allies. Our own British species give an admirable idea of this magnificent genus. The stem of the Water-lily creeps at the bottom of the stream, and is consequently unnoticed by casual admirers, or mistaken for roots. In winter when the leaves have died down, the twisting knotted stems can be seen in the small water-courses which they frequent, bearing a wonderful resemblance to a tangled heap of snakes. From the creeping rhizomes (to use the technical language of botany) the leaves and flowers
e, and it is clear that the fact that the plant lives at the

bottom of the stream must limit it to comparatively shallow water. Every one is familiar with the noble leaf floating so lightly and daintily on the surface, with its symmetrically rounded form, its firm glossy skin, and its indescribable freshness, as well as with the exquisite purity of the white flower. No plant suffers more from being removed from its native element: leaf and flower alike begin to droop almost immediately. The yellow Water-lily is scarcely inferior in splendour of effect in its own place. This glorious form of plant is widely spread throughout the world. In Egypt a beautiful species with blue flowers (*Nymphæa cœrulea*) was a great favourite in ancient times. It constantly appears in the wall paintings and frescoes as held in the hand of gods and mortals; and many architectural ornaments were derived from various stages of its growth. Its literary name is the Lotus, but that appellation is given also to the *Nelumbium speciosum*, which may once have grown in the Nile. This latter plant has lovely rose-coloured flowers, and is found throughout India, China, Japan, Australia, Persia, and even in the Caspian. It is now considered sacred by the Buddhists, and Gautama is represented as seated on it. The leaves are covered with a fine microscopic down, which retains a film of air over the upper surface and prevents it from being wetted, as drops of water roll off it like molten silver; it has given rise to many moral similitudes and proverbs among Eastern nations. But the noblest representative of the order, *Nymphæaceæ*, is found in the great rivers of South America, and will perpetuate in the annals of science the name of the gracious sovereign who now rules our country. This truly royal plant (*Victoria regia*) shows all the features of our British water-lilies on a magnificent scale. The leaf is circular in outline, and when fully developed measures from six to twelve feet in diameter, with an upturned margin all round it to the depth of two or three inches. Above, it is a rich green, but below a deep purple or violet, and it is crossed

and recrossed by a net-work of immense nerves, which in their turn are rendered buoyant by the very large air-canals which permeate them. Indeed, air-spaces occur as well in the cellular tissue, and impart great buoyancy to the enormous disks. The flower is very striking from its size, its rosy blush, and its perfume. The first traveller who described this plant seems to have been Hænke in 1801; it was afterwards seen by Bonpland and D'Orbigny, but it was Sir R. Schomburgk who first attracted general attention to it by a letter to the Royal Geographical Society. The beautiful circular form of floating leaf recurs in other water-plants. It is exactly mimicked in the *Limnanthemum villarsiioides* which belongs to the very remote family of the Gentians, and in the lovely Frog-bit which is systematically still further distant. Another curious fact may be mentioned in connection with aquatics—the predominance of white of remarkable purity in their flowers. In our British streams we have the Water-lily, the Arrow-head with its sharply cut and handsome leaves, the Water-soldier, the Frog-bit, the Water-plantain, the Bog-bean, the Water-violet, all either white or with a faint tinge of pink. Furthermore, as soon as the wide-spread genus of *Ranunculus* leaves the land for the water, it changes its well-known lustrous golden-yellow for a pure white. Readers of Tennyson are aware that he is the first poet who has observed the extreme beauty of

The silvery marsh-flowers that throng
The desolate creeks and pools among.

The botanist was well aware of the extraordinary variability of the Water-crowfoot, long before Darwin's famous attack on the stability of species. When this plant grows in a rapid river like the Wye, its stems will reach a length of eight or ten feet, and its leaves will be all divided into long narrow segments: when it grows in ponds it will have leaves of two types, floating ones with only three lobes or divisions lying

in one plane, and submerged ones cut up into numerous spreading hair-like segments ; finally, starved specimens will be found in wet spots on land which retain only small leaves of the ordinary terrestrial type. No one can doubt that these extremes are simply varieties of the same plant, and botanists did not hesitate to say so at least forty years ago. Although the petals of the Water-crowfoot are purely white, they retain a yellow spot around the honey-pore at their base. There must be some connection, as yet not understood, between the white colour and the aquatic habit.

There are, however, other remarkable plants found under the surface of our rivers. No poet has yet done justice, or, as far as I know, even mentioned the Pond-weeds. It is true that their greenish spikes of flowers are not very conspicuous, although they arrest attention by rising above the smooth level of the stream or pond. But their fresh and pellucid forms foliage miniature groves of wonderful beauty that must have sometimes caught the eye of an idler in a punt. The glorious leaf of the shining Pond-weed (*Potamogeton lucens*) is common in the upper Thames. These beautiful and abundant plants are useful in nature by harbouring innumerable insects, protecting the spawn of fish, and feeding birds with their seeds. It must be admitted, at the same time, that some of these free-growing water-weeds are dangerous to bathers, and offer a good deal of trouble to millers and oarsmen.

No plant of the river-side, however, can exceed, in historical interest, the famous Paper-reed (*Papyrus antiquorum*), a plant of the Sedge family. Biblical students are agreed that it is referred to in four passages of the Old Testament (Ex. ii. 3; Isaiah, xviii. 2, xxxv. 7; Job, viii. 11), in which it is called Gôme. It was used for many purposes, but its great interest was derived from its application as a writing material. From it were derived three words in Greek and Latin, of which two have passed into almost all the modern languages of Europe. *Paper* is derived, through the classical tongues, from

one name of the plant; Bible, through *biblia*, the books, from *byblus*, another of its names; and the Latin *liber*, book, which has passed into the Romance languages, meant the inner bark, which was erroneously supposed to be used. The Paper-reed, like the Water-lily, has a creeping horizontal stem, which throws up a succession of three-cornered cane-like shoots, about eight or ten feet high. The greenish flowers form a loose spreading tassel at the top. The paper was made from thin slices of the stem, cut vertically from top to bottom, placed side by side, and then watered and beaten smooth. The sheets thus formed were afterwards dried in the sun. Light boats were also made of the stems, such as Bruce saw still in use in Abyssinia. Egyptian architecture borrowed many hints for its columns from the elegant Paper-reed. It is not now found in Egypt, but is, probably, abundant enough in the interior of Africa. Dr. Schweinfurth, in 1872, came upon it first in latitude 9° 20' N., but there it formed an immense jungle. It grows abundantly in the Jordan, where that river forces its way through the marshes, once known as the waters of Merom. Sir J. D. Hooker also saw it near the Lake of Tiberias. It grows in Sicily and South Italy, but may have been introduced by the Arabs.

The undoubted* scripture references to this historical reed have been given above, but we may well quote the beautiful passage from Job:—

Can the rush grow up without mire?
Can the flag grow without water?
Whilst it is yet in his greenness, and not cut down,
It withereth before any other herb.

The “flag” thus associated with it is probably *Cyperus esculentus*, the tubers of which are eaten.

In the Rhone and other rivers of Southern Europe is

* The Paper-reed, in Isaiah xix. 7, is considered by critics as a mistaken rendering.

found a plant which has long attracted attention from the highly specialised character of its devices for fertilisation. This is the *Vallisneria spiralis*, a species which, with one other found in Australia, makes up an isolated genus of the *Hydrocharidaceæ*. Long as it has been known, the complicated arrangements which converge upon its pollination must always excite ever fresh astonishment. In the first place the plant is diœcious, that is, bears the staminate flowers on one individual, and the pistillate on another. But in other aquatics with distinct sexes, the pollen is usually borne to the stigma by the wind or insects. In this case an almost unique expedient is adopted. The staminate flowers are floated to the pistillate ones. Developed under water, they detach themselves at maturity from the parent-stalk, rise to the surface, and are of course carried away by the current. Meanwhile the pistillate flowers are floating about on the surface, in which position they are kept by a long, slender, spirally-twisted stalk, which *adjusts itself to the varying height of the water* by uncoiling itself more or less. When the pistillate flower has been fertilised, the stem coils up, and the flower is thus brought to the bottom of the river where it ripens its fruit. This favourite plant of microscopists is very closely allied to the notorious weed which has blocked up so many canals and water-courses, the *Elodea canadensis*, first noticed in Scotland in 1841.

CHAPTER VIII.

RIVERS AS AFFECTED BY HUMAN INDUSTRY.

De grand seigneur grande rivière et grand chemin
Fuis, si tu peux, d'être voisin.

—*French Proverb.* ,

Methinks her patient sons before me stand,
Where the broad ocean leans against the land,
And sedulous to stop the coming tide,
Lift the tall rampart's artificial pride.
Onward methinks, and diligently slow,
The firm connected bulwark seems to grow;
Spreads its long arms amidst the watery roar,
Scoops out an empire, and usurps the shore.

—*Goldsmith's Traveller.*

LIKE most of the powers of Nature which man can regulate, rivers have been, from the dawn of civilisation, the objects of human care. As the earliest States which reached any degree of material prosperity happened to be on great streams, the attention of their inhabitants was forcibly turned in this direction. The Nile, the Euphrates, and the Tigris were all three liable to periodical overflows. The settlers on their banks had, from the first, to take measures, at regularly recurring intervals, for saving their own lives, and preventing damage to their property. Much the same might be said of the dwellers in the lower basins of the Ganges, or the Hoang Ho. At the same time they flowed through lands which would be deserts without irrigation. Consequently, the industrious Egyptians, Babylonians, and Chinese were soon led to various hydraulic devices. Their first attempts were probably limited to the rearing of mounds or earth-works to serve as places of refuge during the inundation, as

even the savages of the Orinoco Delta have sense enough to construct platforms in the trees to preserve them through the same critical period. But from making simple places of safety, they soon advanced to embanking the course of the rivers by huge earth-works, to excavating basins for surplus flood-water, to irrigation canals, and finally to navigation canals. Quays, harbours, and docks would follow as the natural consequences of increasing commerce.

Embankments.—There are two cases in which earth-works are a necessary addition to a river's banks—first, where there is a liability to floods, and, secondly, near an estuary where there is a danger of a high tide breaking in. Egypt is a favourable instance of the first class, as the yearly rise of the Nile is gradual, gentle, and varying only within certain definite limits. The similar overflow of the Euphrates is also manageable, but the Tigris is more troublesome, swelling suddenly like a mountain torrent. Vast works of embankment were carried out both in Egypt and Mesopotamia at an early period. At the present day a similar state of things is a necessary condition of existence in the lower course of the Mississippi. Vast mounds, locally known by the French colonial name *levees*, have been raised along its course at the cost of the States through which it flows. We are told that Louisiana alone has erected on its 780 miles of river-front 75,000,000 cubic yards of earth-works. The type of levee last constructed was 22 feet high, 142 feet at the base, and had a cross section of 1,672 square feet. But much smaller rivers, fed from mountains close at hand, are far more dangerous than these mighty streams which carry off the drainage of a watershed, situated, perhaps, fifteen hundred miles away. The Po, fed as it is by the neighbouring valleys of the Alps, has to be banked up at great expense throughout its lower course, and to be incessantly watched. Indeed, were not the down-rush of the Alpine streams checked by the great lakes, one can hardly divine what the state of the Po valley would be in flood. But

there are cases of large rivers which, after all, defy human regulation. To a certain extent this is the case with the Indus below Kalabagh. A glance at the map will show that no important town is situated on its banks from that point to the sea. The reason of this is that the river shifts its course to an extraordinary extent, owing to the vast deposits of silt brought down by it in flood from the Himalayas. Not even villages are to be found in the immediate neighbourhood of so dangerous a water-course. The Hoang Ho has done still more. Colonel Yule tells us that "In all our older maps the Hoang Ho enters the sea in lat. 34° south of the great peninsula of Shan-tung. This was its true course down to some 30 years ago (1853), and for six centuries before that." But it seems it once had a different issue in the Gulf of Pe-chi-li and has been long making violent efforts to force its way once more in that direction. "This was resisted by a vast and elaborate series of embankments. These gave way partially in 1851; following floods enlarged the breach, and in 1853 the river resumed its ancient course, the plains of Pe-chi-li, and now enters the gulf of that name in lat. 38° ."

But the other kind of river-wall, that which lines the shore of a tidal estuary, is of frequent occurrence. Indeed, in our own island, where estuaries abound, few large streams that have a tide-way can be safely left without a dyke. Its strength will, of course, vary with local peculiarities, the set of the tides, prevailing winds, and similar conditions. The sea-walls that protect the marshes on each side of the lower Thames are said to have been built by the monks. Much rich land is thus saved for pasture, which would otherwise be nothing but salt-marsh. Holland is the classical example of this process on a stupendous scale; for, let it be remembered that that country has to be defended from the great tidal river-mouths as much as from the stormy outer sea.

Canals.—The first canals were doubtless for irrigation, and were suggested by the flatness of the valleys of the Nile and

Euphrates, or rather their imperceptible slope seawards. Where a dam could not well be applied to cut off the supply of water from the river, primitive means of raising it to a higher level were soon adopted, such as the balanced pole called a *shadoof*, or else a water-wheel. In course of time the use of canals for navigation would most naturally be suggested, wherever two large rivers were at no great distance from each other—as, for instance, the Tigris and Euphrates, and the Hoang Ho and Yang Tse Kiang. It is certain that stupendous canals were constructed by early kings in both these cases on that lavish scale which was only possible where an immense slave-population lay at the absolute disposal of a despotism. The Royal Canal of Babylon, built about 1700 B.C., and reopened by Nebuchadnezzar eleven centuries after, was justly regarded by Herodotus as one of the wonders of the country. The Grand Canal of China is a magnificent work. It extends about 700 miles. It was intended not only to be a means of internal communication, but also to drain the flat lower courses of the two mighty rivers, the Hoang Ho and Yang-tse. It is accordingly unusually broad. It connects many other streams besides the two mentioned above, and from the continual action and reaction of the currents thus created, there are few of its reaches which can be considered stagnant. It traverses lakes, drains swamps, and has a great number of flood-gates and bridges. Partly constructed in the seventh century it has, of course, no locks, and is confined to the level country, but it is, nevertheless, one of the greatest works of national utility in the world. It is now indifferently maintained, and has suffered from the extraordinary change of course of the Hoang Ho. The oldest canal in our island would naturally be in the Fen Country, Foss Dyke, and is ascribed to the Romans; it has a course of eleven miles from Lincoln to the Trent. It was, however, on the discovery of the principle of the lock in the fourteenth century, that canal-engineering took a fresh departure. It was now possible for

these artificial rivers to cross high mountains, supposing any one cared to pay for it. The first great continental canal was intended to connect the Atlantic and Mediterranean across France ; it was designed by Riquet, and opened in 1681 ; it was 148 miles long. But this was a channel of communication between two seas, like the now famous Suez Canal, and the still future Panama Canal ; as such it hardly falls under the subject of rivers, and we must content ourselves with a passing notice of it from its great interest.

As is well known, an enormous net-work of canals has been constructed in Great Britain connecting various rivers ; and one, the Caledonian, runs from sea to sea. The development of the railway system has, no doubt, interfered with the commercial value of these water-ways, but there are indications that ship-canal, on a scale sufficiently large to admit steamers, may yet have a future in England.

Improvement of River Beds.—As commerce develops, and the size of merchant shipping keeps on increasing, the importance of sufficient depth of water for a port becomes enormous. Where a river has naturally a wide bed, immense benefit may be derived to any town upon its banks by deepening and otherwise improving the stream. The success of such measures in the Clyde has been very great. Great perseverance and enterprise have been shown in dredging its bottom, embanking it on both sides with masonry, and adapting it generally to the great ship-building industry which has sprung up on its banks, and to the growing trade of Glasgow. The embankment of the Thames is a colossal work of similar character, too familiar to need more than a passing reference. In many rivers, again, a formidable bar forms across the mouth through the deposition of the silt brought down by their waters. The removal or the cutting through of this barrier is often a task of great difficulty, if not impossible. Many a decaying sea-port that flourished a thousand years ago has owed its decline and fall to the

unimpeded action of this natural process. Dangers once formidable to river navigation, such as rocks, and rapids, and whirlpools, can now be removed or greatly modified by modern explosive agents. Still there is a limit to this interference with nature; waterfalls as a rule must be evaded, and not destroyed. Where the expense is likely to be repaid by traffic, a canal can always be constructed to continue the water-way past the difficulty. In this manner a direct passage *could* be made by engineering skill from the Mediterranean to the great Equatorial Lakes of Africa, the Victoria Nyanza and Albert Nyanza; but whether it ever will be done is another question.

Rivers as Water-Supply.—When cities reach a certain stage of population, the question of water-supply both for drinking and for other purposes becomes a serious one. It is not always that a large town can avail itself of a neighbouring lake, as Glasgow has tapped Loch Katrine, or as Chicago has tapped Lake Michigan, or can turn on the springs of a neighbouring range of hills, as Edinburgh gets its supply from the Pentlands. For London the solution of the difficulty at present in vogue is to depend partly on filtered river-water, and partly on deep wells. The river-water is far from being satisfactory, and too much reliance has to be placed upon the perfect order of the filter-beds. The water from the chalk borings is beautifully pure, but it is clear that the supply from that quarter is limited in amount. So many wells have been sunk that the flow of water has been already affected. If we seek guidance from the past, we have the example of Rome. The Romans spared no labour or expense in their public works. Although acquainted with the use of pipes, and with the fact that water will rise to the level of its source, they deliberately chose to bring about a dozen brooks from the Apennines into the city along conduits supported on arches, the well-known aqueducts. A lavish amount of this water was used in the palatial public baths, and in flushing the sewers.

Pollution of Rivers.—One of the unwelcome accompaniments of a large population is the pollution of rivers. This takes place in several ways. First, there is the outfall of sewers. Even the Romans seem to have dismissed the subject of their sewage from their mind when they had once conducted the *Cloaca Maxima* to the Tiber. One would like to know how that comparatively small river was affected when the city became the centre of the civilised world. How rivers are now affected is a matter of daily experience. No one who has gone in a steamer down the Clyde or the Thames can help regretting the terrible defilement to which the necessities of Glasgow and London have reduced those streams. But in Great Britain many polluting causes act with greater force than in the ancient world. In some districts streams of inky blackness or dirty blue roll their Stygian waves; in others chemical refuse poisons the rills. Indeed, so universal is the evil that a very stringent act was passed in 1876, the result of which has no doubt been an abatement of the nuisance. The chief object of this act appears to have been to make an effort to save at any rate the smaller streams for trout and salmon. It enumerates a long list of offences which can be prosecuted, such as throwing solid refuse or cinders into running water, causing sewage to fall therein, causing any "poisonous, noxious, or polluting liquid proceeding from any factory or manufacturing process" to fall therein, *unless the liquid be rendered harmless*(!)

What seems doubtful, however, is how far this act is enforced, except where the proprietors of fisheries interfere. The right way to look at rivers is to consider them as existing for the *good of the whole nation*, and not for the benefit of manufacturers or salmon-fishers. They are part of our national inheritance, and we have no right to hand them on to our descendants grimy and foul with our commercial greed, or, on the other hand, turned into mere breeding-ponds for the selfish amusement of the highest bidder. The short-

sightedness of salmon-rearers has been already punished by the development of a disease undoubtedly due to excessive crowding.

Prospect of utilising Nile, Amazon, Congo, &c.—The question may be asked whether there is any prospect of anything like an adequate employment of the magnificent water-ways provided by Nature in the great rivers of South America, and in the Nile-basin stretching from its mouth to its parent lakes. In the former case we have three systems: one astonishing net-work of stupendous streams discharged by the Amazon; another discharged by the Orinoco, and which is naturally connected with the former; and a third which forms the estuary of the La Plata. It is very doubtful whether the Amazon water-system and the Orinoco will ever be of much commercial importance. It is now nearly four centuries since they were discovered, and they are both almost in a state of nature. There are reasons for this besides the natural indolence of the Spaniards and Portuguese. There is the climate. Both of these mighty streams lie altogether in the hottest zone of the planet, and both run from west to east, almost parallel to the equator. Then the annual inundation is very extensive, and in places reaches a depth of even 40 feet. Now the rise in the valley of the Nile is nearly as great, but all other circumstances are so different. Egypt is a rainless district, enjoying practically the dry healthy atmosphere of the desert; moreover, its vegetation is strictly confined to the area of inundation. The Amazon basin is not only hot, but moist; it suffers from a perpetual steaming temperature, like that of a forcing house. Its rains are very abundant, though not irregular; and its forest-growth the mightiest continuous mass of vegetation in the world. Practically the splendid tributaries of the Amazon, themselves longer than the Danube or the Rhine, are solitary water-ways between the green walls of a forest impenetrable to man. Nature's forces here seem to triumph even over the resources of science; clearings, if

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made, require incessant toil to maintain, and toil is beyond human endurance in a climate which allows man to subsist with the slightest possible effort. It is incredible with what rapidity first bushes and then lofty trees obliterate in twenty years all traces of a white man's settlement. Steam can do much, but what is the use of forming lines of traffic when there are no points to connect? Towns, again, can only be built at the cost of immense expense in the way of embankments and hydraulic engineering. On a smaller scale the same future appears to await the basin of the Orinoco. But a far more hopeful view may be taken of the prospects of the rivers which form the estuary of the La Plata. There are apparently no physical reasons why they should not serve in South America as channels of trade much in the same way as the St. Lawrence and the Mississippi serve in North America. The great rivers of Africa—the Nile, the Congo, the Zambesi, present an enormous length of water-way; and the first leads moreover to a wonderful lake region. The obstacles however to navigation are great—(1) cataracts, which could be avoided by canals, (2) the great heat, (3) the utter barbarism of many of the tribes through which they flow.

For opposite reasons Nature seems to forbid much use of the great rivers which fall into the Polar seas. It may be quite true, as Baron v. Nordenskiöld says, that the Lena, the Yenisei, and the Obi are magnificent streams, and that Siberia is far from being a desert waste. We may, however, give the enthusiastic Swedish savant all the honour due to his courage and skill without sharing his sanguine expectations of a new channel of trade in the Arctic Sea. If that ocean is not so much beset by ice as imagined, it is nevertheless subject to the long night and intolerable cold of those latitudes, and its rivers are annually frozen for five months.

Effects of draining Swamps and cutting down Forests.—It seems pretty certain that as agriculture advances the floods

of rivers become worse. This seems due to the changes made by cutting down woods and draining swamps. The woods once abundant in England, and the swamps which chilled its climate had one desirable function—they acted as reservoirs of superfluous rain-water, and retarded its too speedy descent into the rivers. The complete drainage of vast marsh-lands has brought about a new and startling danger in several districts. The most striking instance is that of the Theiss or Tisza, in Hungary, the largest tributary of the Danube, which carries into the latter stream the drainage of the southern and western slopes of the Carpathians. It seems from Vilovo's investigations that the Theiss rises from three distinct causes—(1) from rain and snow in its own upper basin, (2) from rain and snow in the basins of its great feeders, the Szamos and Maros, and (3) from the effect of high-water in the Danube, which forces back the current of its tributary for an immense distance. These factors might occur separately, but it is clear that if they happen to be combined, their force would be tremendous. Now before 1845 the Theiss used to form at its entrance into the lowland a series of pools, marshes and lagoons, which, however prejudicial to health, acted as an escape-valve for flood-water. At that period, however, began a grand course of hydraulic engineering, by means of which the marshes were drained to the extent of 6,000 square miles, and the stream shortened by 250 miles. The fruitful corn-fields and pastures thus recovered were of course protected by embankments, and the result has been that high-water in the Theiss now is a far more critical period than it ever was before. In December, 1878, and on 12th March, 1879, the town of Szegedin suffered terribly from inundation. And it is difficult to see what remedy can be devised for the evil result of a well-meant interference with the natural conditions of the rivers. The effects of the destruction of forests can fortunately be remedied. They are most clearly seen in mountainous

districts. Reclus has well described them as occurring in the French Alps:—"In the provinces of Dauphiné and Provence the slopes now generally bare were formerly covered with green-sward, and partially with wood, which delayed the flowing of rain and snow-water from the surface, absorbed a great part of the atmospheric deposits, and kept the fruitful soil on the stony and shifting ground. In the course of centuries the woods were cut down by greedy speculators and short-sighted peasants, who wished to add small plots of ground to their arable fields in the valley and their pastures on the hills. Now the rain and snow-water are no longer detained by the roots of the trees on the sloping ground, and rush violently to the valley carrying the waste of the mountain with them; goats and sheep gnaw down the shrubs and herbs left behind: gradually the whole slight covering of soil has disappeared, deep ravines furrow the sides of the hills, and the ordinary effects of erosion are terribly accelerated."

Similar desolation he ascribes to the destruction of forests in parts of Syria, Greece, Asia Minor, Africa and Spain. The French Government have set about what is called the *reboisement* of France on a large scale, and no doubt their extensive plantations will in time have a good effect.

CHAPTER IX.

NAMES OF RIVERS IN GENERAL.

The freshness of the morning dwells with you,
Undying floods! and hence your simple names
Have won a deep-toned music, that can bring
Back in a moment all the by-gone years,
The mystery, and the grandeur, and the pomp,
The weal and woe of untold generations.

THE student of etymology* will be disappointed if he expects to find many picturesque or poetical features in the names of rivers. As a rule they were imposed by simple races of men at an early stage of their existence, when the primary wants of food and shelter absorbed their attention. Still, a gleam of imagination will sometimes light up one's path, and there is always interest in seeing how wonderfully uniform geographical nomenclature has been in the most distant countries. Just as the White Mountain recurs in various languages to denote a snowy peak, so do Red River, Black Water, and similar names meet us under the strangest disguises.

If we begin with the largest rivers of the globe, we shall find their names, as a rule, simply indicative of running water or magnitude. Thus, Mississippi is said to be *great stream* in the language of the Crees, Zambesi the same in an African dialect. Quorra and Niger both mean *river*, the

* On this subject originality is out of the question. The writer wishes, however, to specify his obligations in this chapter more especially to Egli's *Etymologisch-Geographisches Lexicon* (1880, Leipzig), and to some extent to Taylor's *Names and Places*, of which valuable book the chapter on Rivers is far from being the best, from the author's want of knowledge of the Celtic languages.

second word having been assimilated by European writers to the Latin adjective for black. Yang-tse-Kiang is said to mean either *son of the sea*, or *expanding stream*. Its lower course is known simply as Ta Kiang, *the great river*. Orinoco is *river* in a native dialect, so is Ganges, Para, Parana, and the Slavonic Don: Parana-azu, *great river*, is a native name of the Amazon. Guadalquiver, a survival from the eight centuries of Moorish rule in Spain, is pure Arabic; Wad-al-kebir, *great river*, a name occurring in its unchanged form in Algeria. Exe* and Usk simply mean water in Celtic dialects. Amour, properly Tamur, is the *great stream*. Elbe is probably akin to the Scandinavian Elf, meaning *river*. Douro (older Latinised form, Durius), is *water* in Welsh, Aar is simply *running water*, as are also Aa, Ach, Icelandic Á, Rha, Rhine, Rhone.† Advancing from these excessively general appellations which form the first class, we may group the more specialised river-names as follows:—(1) Those which add some epithet to the notion of water, as e.g., colour; (2) those named from tribes or persons; (3) those named from the animal world; (4) those named from the vegetable world; (5) miscellaneous or accidental names.

Names combining an Epithet with Water, or otherwise Descriptive.—Euphrates in the cuneiform inscription discovered at Behistun appears as U-frâtus, the *very broad*. Tigris is the Persian for *arrou*, and is named from its rapid course; the equivalent Hebrew name, Hiddekel, also meaning the *swift one*. Jordan is usually said to be the *descender*, but Egli suggests the *roarer*, though perhaps without sufficient reason to upset the received etymology. Missouri is *mud-river*, from the contrast between its turbid whitish waters and the clear stream

* The British names will be treated separately in the next chapter, from their extreme interest to us who dwell within the four seas, and also from their difficulty; hence they will be for the present omitted.

† Rhodan-us, the oldest form of Rhone, may have another element, not determined.

into which it falls. A great number of names indicate colour, generally arising from the sediment which stains the stream, or occasionally from that of the rocks through which the river has made its way. Thus we have Rio Colorado, Rio Vermelho, Kizil Irmak, Lohit in Assam—all identical in meaning with Red River. The Homeric Xanthus, the Chinese Hoang Ho, are *yellow river*; white usually refers to muddy discoloration, and occurs in White Nile, Pei-ho, Wissen-bach, White Adder, Aspro-potamo in modern Greek. In Switzerland we have Lauter-aar (the *clear stream*) and Finster-aar (the *dark stream*); also Dunkelbach, Finster-bach, Schwarzen-bach, Trübenbach. Black may mean in river-names depth as well as a turbid state; blue refers not seldom to what might as well be called green, as in the case of the Blue Nile. Winnipeg in the language of the Crees means *muddy water*, the same as the Hebrew *Kidron*; Ohio is the *beautiful*. The Garieb of the Hot-tentots is the *roarer*. The pretty name, Minnehaha, *laughing water*, has been made familiar to readers of poetry by Longfellow's *Hiawatha*, but it seems doubtful what is the exact reference of the original. It may refer to the pleasant murmur of the cascade, or the bright streak of white as seen from a distance, but hardly, as a German writer suggests, "to the charming surprise" caused by its unexpected occurrence in the green prairies. The State in which it occurs, Minnesota, is named from a river, meaning apparently *blue water*. In New Zealand we have Wai-kato, *streaming water*, and its sluggish counterpart, Wai-pa, *still water*; another Maori word, Wai-kanapanapa, *changing water*, points to the rapid destruction of its banks by the hot and steaming torrent. The fanciful Hoar-frost River in north America is the translation of a native name which is thought to allude to "the appalling cascades and rapids by which it runs into the Great Slave Lake." Salenche or Salence, in the Valais, is a slight corruption of Salientes, the *leaping streams*. Salt River explains itself, but Baen-á, *petrifying stream*, in Iceland, is uncommon.

Bruar-á, in the same country, is said to be *bridge river*, from the one construction of the kind to be found within the limits of the island; can this explanation also account for a Bruara in Perthshire, where Norse names are not expected to occur away from the coast? Vistula, *hanging water*, in Polish, is named from the high cascades which occur in its upper course. The disagreeable smell of the peat has to bear the blame of the inharmonious Samoyede name, Ngaptéjagako, *stinking water*. Amongst the rivers of Greece, Olbios, the *fertiliser*, occurs in Arcadia; Penëus is probably the *clear or shining*; Eurotas, the *fair flowing*. A curious story is attached to Ameilichos, *the implacable*, a small stream in Achaia, near Patras; formerly it was every year the scene of the sacrifice of youths and maidens to a local Artemis represented as three-eyed (symbolical of the full moon, the waxing and the waning); when the custom was abrogated, the brook was known as Meilichos, *the merciful*. Xeropotamos, in modern Greek, *dry river*, and Xera and Xerias, in the ancient language, all point to the failure in summer of mountain torrents. Achelous is probably *noisy*. Names referring simply to size, length, or shortness, such as Rio Grande, Rio Chico, Groote Riviere, Connecticut, *long river*, abound, as also those derived from the points of the compass, as Rio Grande del Norte.

Rivers named from Tribes or Persons.—Many streams probably preserve the names of tribes or nations once powerful on their banks, as Ottawa, Potomac, Yellow-knife, Delaware; similarly, the early Spanish explorer, Orellana, called the mighty river of Equatorial America Rio de las Amazonas, *River of the Amazons*, from some mistaken notion that it was inhabited by troops of female warriors. In countries where polytheism prevails one may expect to find names of the gods given to streams, though this tendency must have been checked by the primitive idea that every stream was itself a divinity. In India Brahmapootra is the *son of Brahma*: a part of its course is also known as Deo-pani,

God's water; and another as Brahma-Kund, *Brahma's pool*; its rapids have received the picturesque name, Prabhu-kuthar, *Parasurama's axe*, from an early recognition of the eroding force with which they had cut their way through a gorge. Similarly, Irawaddy has been conjectured to be the name of the sacred elephant of the Sun-god, Indra, though Schlagintweit gives a simpler etymology—*rich in water*. Probably many obscure river-names are tribal or national. Ebro (Iberus), is the *Iberian* stream. The Senegal was so named by the Portuguese from a tribe on its banks. In newly settled countries an immense number of geographical names are given in honour of persons, either of Saints by Roman Catholics; or of royal families, or men distinguished in science, or personal friends. Of rivers thus named we may cite the St. Lawrence, Maddelena, San Sacramento, San Francisco, St. Jean, San Joaquin, Santa Cruz, as illustrating one class; Orange, Fraser, Humboldt, Mackenzie, Hudson, Murray, Darling, Mitchell, Hopkins, as illustrating another. It is to be hoped that at any rate the more tasteless of these innovations will in time give way to the old native names.

Rivers named from the Animal World.—From the abundance of swans we have in Iceland, Alpta-a,* *Swan river*, and the same again in West Australia, from the number of black swans seen on it by the Dutch navigator, Willem de Vlaming, 1696; in Russian it is Lebaschji. One would expect the salmon to give its name to streams; the following in different languages express the presence of that fish—Laxo, Laxey, Pataraja gako (in Siberia); Wailetuna is *eel-river* in New Zealand. Small streams, like Trout-beck in English, are called also in German Fisch-bach, and Röthen-bach (from a favourite red-spotted

* In the same locality on the western coast are found also Alpta-fjördur, *Swan bay*, Alpta-vatn, *Swan lake*, Alpta-ness, *Swan cape*, Alpta-tunga, *Swan spit*. The Welsh Swansea has no connection with the bird, being a corrupted form of the Norse Sweyn's-æa, Swayn's Island.

fish). The North American Beg-ho-lo-tessey, *river of the toothless fish*, is quaint. The Hippopotamus gave rise to the Dutch name in South Africa, Zeekoe River, *Sea-cow river*—a name identical with that which the Carthaginian explorer, Hanno, is said to have given long ago to the Senegal, *river of behemoth*, Bambotus in Pliny's Latin (*Hist. Nat.* v. 10). The estuary now known as Rio de la Plata, *Silver river*, is said to have been called by the natives Amara Mazu, *river of serpents*, from the immense number of these reptiles swept into it by the great rivers which combine to form it when in flood. Its present name it owes to Sebastian Cabot, who obtained by barter a quantity of silver from the natives.

In guessing at the meaning of the older geographical names we may consult with profit the comparatively modern ones given by trappers and backwoodsmen. In their low state of culture they resemble mentally the early nations who first gave names; so that we may derive hints from their rough-and-ready coinages. Under the present heading we find in American or Australian maps, Moose river, Souris R., Red Deer R., Beaver R., Rivière du Loup, R. du Lièvre, *Turtle Fork*,* Big-Horn R., Elkhorn R., Bee Creek,* Emu Creek. Snake river, however, is due to ~~the~~ the name of a tribe, the Snake Indians.

Rivers named from the Vegetable World.—If we take the practice of modern times as a guide we should expect to find trees prominent in river-names. For in the Rocky Mountain district creeks are constantly named from the Cedar, Cebolla, Aspen, Pine, and other trees. It ought not to surprise us if we find, as will be shown in the next chapter, that Derwent and many kindred forms mean *oak river*, but our plan reserves the British names for separate treatment. Among Greek names Plataneus is the *river of plane-trees*. Padus, the Po, is said to be from an old Gallic word for the *pine trees* which grow around its upper course. Hoogly, one of the arms of

* In America Fork means a large affluent, Creek a small one.

the Ganges delta, is from the Bengali *hugla*, a gigantic reed-mace which is a prominent feature in the marshy jungle around. Spree is derived by German scholars from the Slavonic Srijpawa, and means *river of sorb trees*. Palumbojjaga (in Siberia) *river of small trees*, alludes to a stunted growth of larches along its banks. Guaroman, in Spain, is a softened form of the Arabic Wadi-r-roman, *the river of pomegranates*. Chicago, the river, was so named by an Indian tribe from the *wild onions* which adorned its banks with their starry flowers. Rio Madeira takes its name from the *forest* through which it flows to join the Amazon.

Miscellaneous Names of Rivers.—Among the singularities of river nomenclature may be classed the traditional origin of Maranon, one of the many names of the Amazon. Its Spanish discoverer, Vicente Yañez Pinzon (1500), when he sailed into the vast fresh-water sea which streamed to meet him, is said to have asked his native pilots, *Mare an non? Is it the sea or not?* but the story is probably apocryphal. Godavery, *cattle-giving*, is original; so is Torne-vesse, *saw-mill driver*, in Waadtland. Minho is from *minium*, *vermilion*, found in the country around it; Petchora is from the *caves* along its upper course; similar is Guadalhorra or Wadi-l-ghar, *the river of the cave*. Other Arabic river-names in Spain beside those already given are Guadalcazar, *the river of the palace*; Guadalaxara, *the stony river*; Guadarranke, *the mare's river*; Guadalupe, *the river of the bay*; Gadiana is simply *the river Anas*, the old name—(Isaac Taylor's *Words and Places*). Some of the modern American names are very droll, and evidently sprang from trivial circumstances in the daily life of the first explorers of the country; such as, Oh! be joyful Creek, Frying Pan Creek, Cannon Ball R., Powder R., Bitter Root R., Dirty Devil.

In the unsettled parts of the vast wilderness which abuts on the Rocky Mountains, the surveyors have often been obliged to indicate the tributary streams by numbers 1, 2, 3, 4, in default of any distinctive appellation.

CHAPTER X.

NAMES OF BRITISH STREAMS.

Love thou thy land, with love far-brought
From out the storied Past.

—*Tennyson.*

No thoughtful observer can have failed to remark that, as a rule, the names of rivers in Great Britain have no significance to English ears. The Thames, the Severn, the Trent, the Ouse, the Humber, have been household words to generations of Englishmen who have lived and died on their banks without a notion of their meaning. The Tweed and the Teviot and the Tay are equally puzzling to the Scotch Lowlanders; the Liffey and the Shannon, the Towy and the Teivy to the average Irishman and Welshman. It is generally thought enough to say that these names are old Celtic, and beyond that conclusion few care to go. For even in districts where scores of river-names are intelligible to Celtic ears, many of the greater streams present forms the meaning of which can at present only be guessed at by the processes of comparative philology. One of the names given above will serve as an illustration. The Towy, a fine river in South Wales, has so old a name that it occurs almost unchanged in Ptolemy's list (about 50. A.D.) as Tobius; but, though the Welsh language is as much spoken on its banks as anywhere, no tradition of its meaning has survived. From this typical example we learn something of the difficulty of the task which any one undertakes who attempts to get at the meaning of the river-names of Great Britain and its neighbouring isles. But if it is a dry and thankless branch of inquiry, surely it is one that *must* interest every lover of his native country. For our

streams are no inglorious water-ways, like those of Borneo or New Guinea, but rivers of old renown, famous in history, embalmed in poetry, and reproduced again and again on the other side of the globe by colonial patriotism.

Are the Names Celtic?—There seems no reason to doubt the current opinion that the vast majority of our river-names are Celtic. The English names are few and far between, and, with the exception of the Mersey, a title confined at first to the estuary, are generally small brooks, such as Trout-beck, Snell-batch, Coal-brook, &c. It is not easy to see any reason why Celtic river-names have had such an extraordinary vitality; for they have survived also in France, North Italy and parts of South Germany. It is perhaps a general rule that river-names should be permanent, but there are exceptions to it. In the east the Euphrates, the Tigris, the Jordan, the Halys have all lost their old titles. Even in Greece and Italy it is astonishing what changes have taken place in this department of geographical nomenclature. The largest river of Greece, the Achelous, is now known as Aspro Potamo (the White River); in Italy the Anio is the Teverone, the Liris the Garigliano. But whatever may be the reason for it, the fact remains that our British river-names are some of the oldest in the island: they crop up like bosses of primeval rock, which remain here and there to bear witness of the extensive strata which have disappeared before the agencies of denudation. They are pre-historic relics, water-worn and battered, but throwing some faint light on the twilight ages of which no written record has remained.

Two Immigrations of Celts.—But it is now time to distinguish more accurately between the two great immigrations of Celts—that of the Gaels and that of the Cymry. As far as research has yet arrived at definite results, they may be thus stated:—Successive waves of population coming from the east have occupied these islands. The oldest settlers would appear to have been a long-skulled race, and to have constructed the

oldest *long* barrows. It is premature to say who they were, or what language they spoke: if they were Iberians, the ancestors of the Basques, a few isolated Iberian names may still linger among us. These first comers were conquered by a succeeding wave of Celts, of the Gaelic branch, now represented by the Irish and the Highlanders of Scotland. Perhaps after two or three centuries, a second Celtic population followed, the Cymry, represented by the present Welsh and Cornish, who subdued the Gaels or drove them before them to the extreme west and north.

After the Cymric tribes had pretty well established themselves the Romans landed on the mysterious island which had so long been a kind of fable-land to the cultivated nations of the Mediterranean basin, and from that date onward we have had written records to assist us. Such having been the history of the Celtic Immigrations, we would naturally expect that pure Gaelic river-names would occur in the districts into which the Gaels withdrew, and that Cymric names would occur chiefly in the countries nearest to the Continent. And such undoubtedly is the case. Premising that the Irish-Gaelic and Scotch-Gaelic are almost identical, we may say that among river-names pure Gaelic occur in Ireland and the Scotch Highlands and Islands, pure Welsh or Cymric in parts of Wales, and modified Celtic names in England. It is only natural that the last should be much disguised. The following rules may be of service to the etymologist, and are illustrated by examples:—

(1.) River-names occurring in England will *probably* be Welsh, but it is also *possible* that they may be Gaelic. As an instance of the first class, *Even-lode* is a disguise for *Avon llwyd*, the gray or muddy river; *Windrush* or *Wainrush* is *Avon rhôs*, the swamp river; as an instance of the second, in Devonshire, there is found a river *Inny*; but in Ireland we still have *Owen inny*, where *Owen* is the anglicised form of *amhain*, river; *Inny* consequently is the adjective, whatever it may mean, and not as Mr. Isaac

Taylor supposes, a corruption of *avon*. Another Gaelic name occurs in Sussex, the *Cuckmere*. The first syllable is the Gaelic *caochan*, a *stream* (*ao* pronounced as *u* in *gun*); *mere* is obviously a later addition, being Norman-French, and alludes to the lake-like appearance which the tidal part of the river presented at high water. (The eastward drift of shingle has much blocked up the river-mouth at present.) These examples show us that an English river-name may be either Welsh or Gaelic, and that in a case of difficulty its oldest original form should be sought in the wildest parts of Ireland or Scotland as well as in Wales.

(2.) Rather than accept a bad etymology, we should be content to wait for a fuller knowledge of the languages. Immense quantities of Celtic MSS. have not yet been printed, and must contain hundreds of obsolete words which have fallen out of the dictionaries. To take an illustration from our own literature, what a wealth of old words is found in the Early English Alliterative Poems (date about 1360 A.D.) of which the *Deluge* is a fair specimen, which would be sought in vain in dictionaries of the modern language. *Stour* and *Humber* are river-names that have defied analysis as yet: all we can say is that *Stour* occurs as *Stura* in Piedmont, and as *Stor-elf* in Norway (where *elf*, *river*, seems added to interpret it). These facts would point to an obsolete word for stream. *Humber* may be a personal name, according to the old tradition, which may well embody some kernel of fact.

We shall now proceed to take a few groups out of the immense number of British river-names, which can be made out with some approach to certainty.

Taff, Tavy, Tawe, Taw, Tay, Tame, Teme, Tamar, Thames, Teign, Tyne.—In South Wales there are two rivers called *Taff*, and it is obvious that the names *Tavy*, *Taw*, *Tawe*, *Tay* (known to the Romans as *Tava* and *Taum*), also another *Tay* in Ireland, are only variations of the word. Now in what do

all these streams agree? Probably only in one point, and that is in having a wide estuary, a tide-way which is often quite disproportionate to the length of their course, as in the Tavy. But in Welsh the word *taf* means an expansion, and the inference seems pretty safe that these rivers are named from the most striking feature which they present to immigrants coming by sea, the fair broad breast of placid water at high tide. The Gaelic form corresponding to this is *tamh* (pronounced *tav*), and now meaning *placid*, *quiet*. Hence, the Welsh form of Thames is *Taf-wysg*, the Gaelic *Tam-wysg*, which were written by Cæsar as *Tam-esis*. The meaning of the name is *still or spreading water*, the allusion being to the far-reaching lake-like estuary at high tide. The same word *Tam*, with a local variation in the suffix occurs in *Tamar*, the river of the far west, so remarkable for its marvellous tidal expansions. But when we find that another Welsh name for the *Thames* is *Tain*, we have the key to the *Teign* and *Tyne*, and also to such a local name as *Teyn-ham*, situated on the *Sicale*, a quiet creek of the wide-reaching *Medway*. What an interesting glimpse we get here of the far distant age when the frail barks or rafts of the first Celtic immigrants ventured to cross from the Continent. Well might they welcome the wonderful series of estuaries along our south-western coasts, as well as that of the Thames, which would naturally be the first discovered. It would be pretty safe to conjecture that the rivers mentioned above were first named in their lower course. Afterwards, when the country was better known, the *Tame** (often spelt *Thame*) and the *Teme*, inland rivers, were also named from their sluggish current, or stagnant marshes.

* Our early topographers invented an etymology for the Thames from a combination of Thame and Isis. The objections to this are—(1) that *Isis* is probably a literary word confined to Oxford Latin verses; (2) that it would imply that the two tributary streams were first named, and that the great tidal river remained without a designation until that had been done! Far more probable is it that the upper streams were named centuries after the *wharfy*. To the present day the country people know no *Isis*.

Avon Group.—*Avon* is the English modification of the Welsh word *afon*, *river*, which appears in Gaelic as *amhainn*, or *abhainn* (*mh* in Gaelic corresponding to *f* or *v* in Cymric). It is clear that the word could only become a name by having a distinctive epithet attached to it. Consequently, in the Celtic-speaking parts of our islands we find *Abhainn dubh*, *Amhain Snizort*, *Afon llwyd*, *Afon Tarenig*, and so on. Even in England, where five Avons are found, the tradition of the lost adjective has not entirely disappeared, for it is still known that the Stonehenge Avon is properly *Afon helig*, *the willow stream*. But, although the word *Avon* occurs but seldom in its own shape, it lurks very often under various disguises. As already mentioned, Even-lode is *Avon llwyd*, *gray stream*. Evan occurs in Scotland, and other variations are Aune, Ewe, and in Ireland Owen. *Wind rush* or *Wain rush*, is *Avon rhôs*, *Swamp-stream*; *Vandal* or *Wandle*, which gives its name to Wandsworth, certainly contains *Avon* in its first syllable, and so does *Woundale* and *Oundle*. Other traces of it are to be found in the local names, *Wambrook*, *Wampool*, *Wansford* (2), *Winsford*, *Wimborne*, in all of which an English word is appended in explanation of the obsolete Welsh (*Wam-brook* = *Avon-brook*). In *Wanborough*, however, Isaac Taylor thinks there are traces of Woden, but a series of intermediate forms can alone decide the doubtful cases, and that is precisely what we cannot always get. The Cymric form *Avon* occurs in Scotland and even in Ireland, where the *Avon-more* and *Avon-beg* join to form the *Ovoca* in Co. Wicklow. The form *Owen* is that usually assumed by *Amhain* in Ireland, and to this belong apparently *Own-gar*, *Oo-lagh* and *Owley*. Following another track we get *Awbeg* (= *little stream*), *Auboy* (= *yellow stream*), *Aubourn* (second element is English, translating the first), and *Augillbeck*, where the first syllable is Welsh, the second Gaelic, the third Norse. *Yan-worth* and *Ains-worth* probably betray their kinship to *Avon*.

Usk, Ouse, and Exe Group.—We now come to a group which are all descended from an old Celtic word for water.

which in Gaelic is *uisge*, in Cymric *wysg* or *gwysg*. The number of streams so called is perhaps small, but the place-names which embody the root are endless, and endlessly varied. The name occurs least altered in a Yorkshire brook, *Wiske*, then the *Usk*, and probably through its Latinised representative *Isca*, the *Exe*, the *Esk* (several), *Axe* (2); also the *Ouse*, of which *Isis* is apparently a poetical form due to the quaint pedantry of a mediæval university. But it is in names of places that this root assumes protean disguise; as in *Ash-by*, *Ash-bourne*, *Ash-ford*, *Ash-combe*, *Ug-ley*, *Ock-ley*, *Ug-thorpe*, *Ow-thorpe*, *Uck-field*, *Ug-borough*, *Ick-borough*, *Ick-ford*, *Ick-worth*, *Ex-ford*, *I-ford*, *Oke-ford*, *U-ford*, *Ax-ford*, *Uggs-combe*, *Wish-ford*, *Huyshe*, *Ox-ley*, *Ox-ford*, *Ox-ton*, *Ox-hey*, *Wax-ham*, *Wax-holme*, *Wax-well*, *Wash*, *Wash-bourn*, *Wash-brook*. (The early names of Uxbridge are here instructive—*Wax-bridge*, *Wox-bridge*, *Ox-bridge*.)

We might be disposed to dispute some of these etymologies if they were isolated words, but their real meaning is seen at once by comparison. For instance, in the middle ages *Ox-ford* was universally taken as the *ford of Oxen*, and again *Ash-ford* might well be named from the tree; but what are we to say to the long-connected series, ringing the changes through all the vowels—*Ax-ford*, *Ash-ford*, *Ex-ford*, *I-ford* (softened from *Ix-ford*) *Ick-ford*, *Oke-ford*, *Ox-ford*, *U-ford* (softened from *Ux-ford*)? It is clear that they all hang together, and that the first syllable is *water*, *wysg*. Similarly, it is very excusable to suppose *Wash* to be the place where the waves *wash*, but the existence of a river, *Guash*, points to *gwysg* as the real root. Anglo-Saxon usage is here of no assistance whatever: they simply assimilated Celtic names without troubling their heads at all about their meaning.

We must add to the river-names given above *Og-more*, *Ow*, *Og-wen*, *Oke-ment*, *Eask*, *Fin-ish*.

Root *gwy*.—Another word simply meaning water is the old Celtic *gwy*, which has produced three rivers called *Wye*, two *Ways*, and enters into many local names, such as *Wy-comb*,

Wy-cliff, in Yorkshire, from which our great English reformer derived his name. In a more genuine form the root occurs in Ireland in *Gwee-barra*, *Gwee-dore*, *Gwee-stin*, and in England as *Gwy-thorn*, and *Bach-wy* (little stream). *Eye*, when a river-name may be this word, but if an island is of course the A. S. *ea*.

Root dwfr, dwr, dobhar.—The simple word for water given above appears as *Dour* in Fife, Aberdeen and Kent, *Dore* in Hereford, *Doro* in Queen's County, and *Durra* in Cornwall. It may be the root of *Doveran*, *Dover*, *Dove*, *Dovey*, *Dyffi*. In *Dur-beck* we have the familiar translation of the first syllable by the second. *Adur*, in Sussex, is identical with *Adour* in the Pyrenees, but the names cannot be fully explained. Is it possible that the river-names *Thorne*, *Torne*, and *Tornea* are modifications of *dwr*? An immense number of local names begin with the word *Thorn*; Lewis, for instance, in his well-known *Topographical Dictionary of England*, gives *seventy-two* names of parishes and hamlets with this prefix. Surely they cannot all be named from the thorn-tree. Thorney occurs three times, and as thorns of any kind do not occur usually in wet swampy islands, it is far more reasonable to suppose that *Thorn-ey* is equivalent to the *isle among the waters*. If this conjecture is accepted, we may see another trace of the word in *Fin-dhorn* = *bright stream*.

The Don Group.—It has been usual to consider the *Don* as type of a group. But in our islands there are very few rivers of this class, only the *Don* (2), *Doon*, *Doon-beg*, *Dun*, and perhaps the *Dean*. In Eastern Europe this syllable plays an important part in the vast rivers of Southern Russia, such as the *Don* itself, *Don-etz*, *Danapris* or *Dnieper*, *Dan-aster* or *Dniester*, and *Dan-au* (the *Danube*). But as it is probably a Slavonic root, it would as such have no place in our country.

Descriptive Names from Trees, Animals, Colour, &c.—We will now attempt to unravel a few names which have a significance beyond that of running water.

A glimpse of the great amount of wood-land once extending

over our country is to be got from the streams named from the oak. In Wales we still find the original grammatical form, *Afon derwin*, the *river of oaks*. In England this name appears as *Darwen*, then *Derwent* (final nasal being strengthened by *t*), then *Darent*, then *Dart* (as is proved by the two forms, *Darentford* and *Dartford* of the same name). Thus singularly enough the river *Dart* derives its name from the oak-forests on *Dart-moor*, of which a dwindled relic still remains in Wist Wood: at the same time the English settlers long ago assimilated the old Celtic word to one which denoted swiftness. Irish corresponding river-names are *Derry*, *Daragh*, *Derreen*, perhaps *Dearn*; many other local names, such as *Ballin-derry*, *ford of oaks* (to the number of 1,300 according to Joyce*) bear witness to the former prevalence of that tree in Ireland. After the oak the willow must have abounded along water-courses, and accordingly we have *Ely*, from the Welsh *Afon helig*, *willow-stream*, and in the Lowlands *Saughburn* and *Sauchieburn*, *brook of willows*; in Ireland *Pol-sillagh*, *pool of willows*, and probably many similar names in the Highlands. The graceful birch has given its name to *Birkbeck*, *Allt bea* (Ir. G., *beith*), *Behy*, and the Welsh *Edw* (for *afon fedw*). The sombre yew is probably the sponsor for *Yeo* (Ir. G., *eó*, pronounced *yó*), and for *Udale Beck*, the English name for the yew being apparently borrowed from the Celtic, or at any rate almost identical with it. The stately elm is credited with the origin of the several *Levens* (G. *leamhan*, pronounced *leven*), and the names which may be corruptions of it, such as *Leam*. Among isolated names Dr. Joyce gives *Funcheon* as the stream of the *ash-tree*, a fact which reminds us of the extreme

* It is impossible to speak too highly of Dr. Joyce's books on Irish names of places. He has at the same time an intimate knowledge of the native language and literature, and the scientific spirit of modern philology. There are few books yet written on Celtic names which are of equal value. Scholars with the same qualifications would take in hand the Scotch and English names, we should at last have trustworthy materials for the comparison of the old names of our British rivers.

frequency of *Ash* as a prefix to English local names: though usually a corruption of *wysg*, it is possible that in some cases the tree is meant. The same author mentions a stream in the Killarney district named after the characteristic *Arbutus-tree* (*Owen a Cahina*), an incidental argument for the indigenous origin of that beautiful shrub. Probably a thorough search of maps would bring to light several brooks like *Blaeberry Beck*, *Blackberry Stream*, and Ir. G., *Smearlagh*, named from our wild berry-bearing shrubs. The beautiful Rowan-tree which lights up the autumnal landscape with its glorious coral balls is commemorated frequently, as in *Allt a chaorain*, the *Elder bush* in *Trim-oge*, (Ir. G.). Many names were suggested by the animal world. The first given would probably be those that indicated some pasture for the domestic flocks and herds. Thus there is in Irish Gaelic *Ouna-geeragh*, *river of the sheep*, identical with the Scotch Gaelic, *Amhain Caorach*. Many brooks are named from the ox, the cow, the calf; one of the quaintest is *Owendadulagh*, *river of the two milch cows* (Joyce). So valuable an animal as the pig would not be passed over; hence *Muick*, in Irish Gaelic, and a long list of local names in English beginning with *Swin*, of which *Swinbrook* and *Swinburn* are to the point. *Owen-na-gloor* (Ir. G.) and *Avon Ysgethon* (Welsh) both mean *river of wild pigeons*, while the poetical *Brook of the Hawk's Grove* in the Highlands brings into prominence their great enemy. A greater number of names has probably been given from colour than can now be traced. In the wilder parts of Ireland and Scotland, where the Gaelic names are unchanged, black and red and white occur very frequently as epithets, and the same may be said of the Welsh districts. It is very likely, therefore, that many of the puzzling forms in England are simply expressive of colour. To proceed, however, to details, for *white*, *clear*, or *bright* are used several words: (1.) Gaelic, *ban*, found in *Bann*, *Bane*, *Bain*, *Beane*, *Binnock*, *Bann-ock-burn* (white-water brook). (2.) Gaelic, *geal*, in *Gala*, *Gale*, *Galey*, *Gelly*; (3.) Gaelic, *fion*, Welsh, *gwyn*, *gwen*, found in *Finglas*, *Findhorn*, *Gwain*, *Gwennap*.

The opposite *black* is expressed by Gaelic, *dubh*, Welsh, *du*, and is very common to express the hue of peat-water, as in *Douglas*, *Dulas*, *Dowlas*, from Sc. G., *dubh glais*, *black stream*. *Red* is frequent under the form *ruadh*, G., and *rhudd*, W., and is probably the explanation of *Rotha*, *Rother*, *Rothay*, *Roe*, *Roe-burn*; in confirmation of which it may be mentioned that in Ireland *abhuinn ruadh* is actually modernised into *Owen-roe*. *Liath*, G., or *llwyd*, W., *gray*, is often applied to the dull discoloured waters of a meadow-brook, and probably explains *Lea*. In Ireland *Owen-boy* and *Owen-woe* both arise from *abhuinn bhuidhe*, *yellow river*. When we consider how common names from colour are, we are led insensibly to venture upon a bold step for an etymologist, and to suggest a simple and obvious explanation of the Don. Why is it not the Gaelic *donn*, *brown*, an epithet suitable enough to the Aberdeenshire river, and probably to the two or three others?

Enough has now been done to show the difficulty and methods of this branch of inquiry, but further details would probably be tedious. An appendix has been added to this chapter which gives a long list of river-names, and will enable the reader to see how ample a field remains for discovery. Unfortunately we must confess our inability to explain the etymology of some of our finest streams. The majestic *Severn*, the broad-bosomed *Humber*, the beautiful *Towy*, the romantic *Tweed*, the *Trent*, the *Stour*, the *Teifi*, the *Teviot*, are among the hundreds of more obscure names which have not yet yielded up their secret. This almost virgin field of research may be commended to all those who possess that intimate knowledge of the inflexions of the Celtic languages,* which the writer of this chapter lacks.

Note.—The author must apologise for a certain amount of repetition, almost unavoidable, in treating British rivers separately from others. He is afraid he has stated the same fact more than once in different connections.

*To mention one special difficulty, the non-Celtic student is misled by the changes of the initial consonant in the declension of nouns in Welsh and Gaelic.

APPENDIX.

MR. SOUTHGATE'S WORKS.

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and.

in Great Britain and Ireland.

ould mount up to at least two thousand river-names occurring in the districts of the United Kingdom. included as throwing a light on

the processes by which they have been doing chapter.

the river-glen, but they are given as themselves.

here it does not interfere with

elic, it is not meant that it is not in Scotland it is at any rate the when a word is given as Welsh, it is the Gaelic. The nearest etymologies are, as a rule, omitted.

Welsh, G. for Gaelic, Sc. G. for

the words between which it stands

; *Longus*, in Ptolemy's Latin

our in Southern France).

continent Aa, Au, Aach, Ach).

er clear.

Aah, Aie, Ah, Aire; probably Sc. G. *allt*, mountain brook.

Allwen, W. *white brook* || Allo.

Allt, Sc. G., a brook with deep banks, as *Allt Bea*, Birch Brook, *Allt Cam Winding Brook*, *Allt Odhar*, Dappled Brook, *Allt na Fearn*, Alder Brook, *A. Ruadh*, Red B., *A. Cuaich*, Cup B.

Ammau, Sc. G. *amhain*.[†] See Avon.

Annas, Annagh, Annalee, Aney, Annick || Ancholme || Anker || Anton.
 Aras, Arua, Arou, Aray, Arigna—(may contain root, cognate with Aar, Aarr).

Ardle || Arney || Artro || Argidean, Ir. G. *silvery* || Ardle || Assel || Asker.
 Avon, W. *afon*, G. *amhain* or *abhainn*—pronounced Aven, Owen, River.
 In Wales *Afon Uryd*, *Grey River*, *A. helig*, *Willow R.*, *A. ysgetho*,
R. of wood-pigeons, *A. ddu*, *Black R.*, *A. fawr*, *fechan*, *Great*, *Little R.*, *A. hexyn*, *R. of water-flags*. In Highlands of Scotland, *Abhuinn ruadh*, *Red R.*, *A. spithack* (pronounced Skiack), *Rapid R.*, *A. ghail-each*, *Boiling R.* In Ireland *Owen beag*, *Little R.*, *Owenduff*, *Black R.*, *O. boy* and *O. wee*, *Yellow R.*, *O. ass*, *Cataract R.*, *O. clogy*, *Stony R.*, *O. wre*, *Cold R.*

Awbeg, Sc. G. *abh beg*, *small river*.

Avie, Aune—probably corruptions of Avon.

Anghria. Is it Ir. G. *abh greine*, *stream of the sun*, referring to Pagan worship of nature?

Axe, form of *aisge* or *ayser*, *water*. See Usk.

Aylort.

B

Ba. from Sc. G. *baa*, *oxen*; perhaps better from Sc. G. *beath*, *birch*—(cognate with *Baa Lake* in Brandenburg) || Bachwy, W. *small stream*. See Wye.

Baddoch, Badach-ro || Bailey || Balgay || Balvaig. ||

Balder's Beck, E. named by Norsemen from the divinity Balder.

Bann, Bain, Bane, Beane, Binn, Binnock, Bannockburn (Bann-ock-burn), from Sc. G. *baa*, *white* or *clear*.

Bander || Banw, W. *brook of swins*, like Swinburn.

Barbhaic || Bargood, W. *under the wood* || Barr || Barrow || Baw. See Ba.

Bedale, Betha, Behanagh, Behy, *birch-river*, from G. *beath*—pronounced *Bee* or *Ba*.

Belay, Beaully, Beaulieu, Beelo—French form, result of assimilation.

Berrie || Bladnoch || Blea-berry Beck, E. from the plant || Blyth, possibly E. *merry*.

Birk-beck, Birket, E. from *birk* or *birch-tree*, || Blackwater, E. literal translation of Celtic name.

Bollen || Bonet || Boon || Bow || Bourne, E. *a brook* || Bown, Ir. || *con-tribute Bo-rumha*.

Borth-wick, *wick* is creek || Boyd ||

Braid, Bray, Bredy, Brid, Bredy ||

Bran, Ir. G. *muddy* || B

Bruar. Brue.

Baddon || Bulmer || Bu

Bare || Barry ||

Bush, Ir. G. *bus*, beast's mouth, 'gape': from occurring in a wide gap in the line of cliff leading to Giant's Causeway.

C

CAAF || Caha || Cain || Calair || Cally || Calder, Caldew || Callan || Calettiwr || Cam, Cam-dwr, Cam-owen, Cam-oan, Allt Cam, *winding stream*, from adj. *Cam*, common to all Celtic dialects. || Camel, Cample (may be cogn. to last).

Caragh, Carey, Carvey || Carron, Carrown-isky || Cart || Cash, Cashen, Ir. G. *a road* (Joyce) as forming line of communication into interior.

Cassley, Cashla, Ir. G. *sea-inlet*.

Cat-water, deep estuary of Plym; is it from Ir. G. *Cath*, *a battle*?

Cerne || Ceryst || Char, Charwell, Chart, Charnet, Churn, Churdon.

Cheddar || Chelmer || Chew || Ciarm || Cibbi, Kippo, Kip.

Clady, Claddy, Clawdy, Claw, Cleddan. || Clyde, Clwyd, Cluden, Cluny.

Clywedog || Claerwen, Laureen, Clare || Clist || Cloon, Cloonagh-more Clogh, Ir. G. *stony*.

Cock-beck, Cocker, Coquet, Cog, Cuck-mere, from Sc. G. *caochan*, *stream*.

Cod-beck || Cole, Coyl, from G. *coill wood*.

Coe, Cona, Coneach, Conglass, Conry, Conan, Coney.

Coomhoola, Ir. G. *glen of apples*. || Corfe, Corve, Cover || Coran, Cran.

Cothi || Costa || Cour.

Colne, Latin from *colonia*; at St. Alban's, river C. had older name, Ver. |

Crake || Cree || Crewyn || Cruden || Crammie, Crammock.

Creedy || Creran || Crawick || Crichup || Croglin.

Crouch || Crowndale.

Crumlin, W. and Ir. G. *curved glen*, equivalent to the English Crook-dale-beck.

Culm or Columb, named from the Saint, as are many local names in Ireland and Western Scotland.

Cullenagh, Ir. G. *stream of the wood*.

Cusher || Cynfael.

K

This letter is only an English way of representing the Celtic C, which is always hard; consequently the few names beginning with it are given here in their right connection.

KAIL, Kale, Kelly, Kell.

Kebeck.

Ken, Kennet, Kent, from Sc. G. *cann bright*.

Ken-mare, Ir. G. *head of the sea*; i.e., *limit of tide*, extended from place to whole estuary.

Ken-win || Kesh, Kishorn || Kelvin || Kerbet.
 Kielder || Kidlock || Kilcoo || Kindy ||
 Kinglas, Ir. G. *bright stream*.
 Kirkay || Kirbney.

Q

This letter in Celtic names is either for the Gaelic cu—or cao—or else for the Lowland aspirate wh—.

QUAGGY, English, can hardly be referred elsewhere than to *quag-mire*.

Quhair, Quharity.

Quin, may be Ir. G. *caoin*, *beautiful*.

Queich, Quoich, (in Silesia Queiss) from Sc. G. *Cuach*, *a cup*, either from cauldron-like pool, or deep hollow glen.

D

DAFF, from Ir. G. *damh*, *an ox* (pron. *dav*.) || Dall, Dawl.

Dane, Dean, Dene, Dinin, Dinnie.

Darwen, Derwent, Darent, Dart, Derry, Daragh, Derreen, Daer, Darr, Deer, either from W. *afon derwyn*, or Ir. G. *abhain na darrach*, *river of oaks*. Ptolemy's *Vin-deris* in Ireland is surely this: 1,300 Irish local names contain *the oak*.—(Joyce.)

Dargle || Dawles || Dernol. || Ddaw, written Thaw in English.

Dee, W. *dwfdrwy*, Goddess's stream. (So Welsh scholars, but not satisfactory as not explaining Kirkcudbrightshire Dee in *Galloway*, i.e., a Gaelic district.)

Deugh.

Dealagh, Deel, Dilly, Dulsk, from Sc. G. *dilé*, *a flood*.

Deveril || Dibb || Dinnie || Dionard || Disyn-wy. ||

Dove, Dovey, Doveran, Dore, cognate with W. *dwfr*, or *dwr*, *water*.

Dyffi, Divie. || Dochart, || Doe, || Dodder.

Don, Doon, Doon-beg, Dun, Dun-oge, perhaps G. *donn*, *brown*.

Dripsey || Dryfe || Drwrydh || Drowles.

Douglas, Dulas, Dowlas, from G. *dubh glais*, *black stream*.

Duag, prob. *black water*, G.

Duart, do.

Dulnain || Dyke, English.

E.

Eamont || Eany, Ir. G. *ivy-producing* (Joyce) || Earn, Erne, Erme. !

Ebbw or Ebwy || Echaig || Eddlestone ||

Eden, Ewden, perhaps from Sc. G. *athan*, *shallows*.

Eddlestoun || Edw., W. from *fedw*, mutation of *bedw*, *birch tree*. "

Effock || Effra || Einig || Einion || Eilt || Elan || Eller ||
 Ely, Elyaugh, in W. *afon helyg*, stream of willows ; in lowland Sc. Sauchie-
 burn.
 Errochy.
 Esk, Eask, Exe, Esy, Esker, Eskle, variations of *uisge*, water. See Usk.
 Eslin || Ettrick || Eye, from W. *gwi*, water ; not same as place-name
 from A.S. *ea*, an island.
 Ewe, Ewes, Evan, Eve-lix, cognate to G. *abh* water, or W. *afon* river.
 Even-lode, W. *afon-llwyd*, the gray or muddy stream.
 Euchar || Euchar || Eweny, Even-eny.

F. and V.

(In Celtic tongues V is only a mutation of F.)

FAL, Feale, Fall-och || Fane || Farigag, Farg.
 Faughan, Feochan, W. *fechan*, small || Fender || Fernate.
 Fiag, Fiodhaig, Fiddich, Fithie, from Sc. G. *Fiodhag*, bird cherry.
 Feugh, Sc. G. *fiodh*, a wood (pronounced *feugh* || Figde.
 Fishie, corruption of *uisge*, water.
 Fin-art, Fin-ella, Finn-ish, Finn-ock, Fin-glas, Fin-dhorn, all contain Sc.
 G. *fiou*, bright, and a word meaning stream (*ish*, *ock* from *uisge* ; *glas* is
glais ; rest not known.)
 Fleet, Norse word for tidal creek where small ships could float.
 Fleak || Forth || Font.
 Forsa, Forss, Foss, Norse words for waterfall (*a* in Fors-a is river.)
 Forgue.
 Foyle, from Ir. G. *phuill*, oblique form of *poll*, pool, from deep inlet.
 Foyers, related to Ir. G. *Foir*, proper name of the Nore, perhaps also to
 Fowey (pronounced Foy).
 Freswick, Norse *fresh wic*, a creek where fresh water could be obtained.
 Frome, perhaps softened from W. *ffrwd*, brook.
 Fruid, less changed form of W. *ffrwd*.
 Funcheon, Ir. G. *ashtree-brook* (Joyce).
 Vartrey, Ir. G. *Fir-tire*, men of the territory, old tribal name according to
 Joyce.
 Ver, old name of river at St. Albans, whence Verulam (cf. Var in Southern
 France).
 Vinnie, variation of Finnie.

G

Gadie || Gairn, Gairney, Garnock || Gauer, Gour.
 Garry, Sc. G. *garbh*, rough, see Yarrow || Garpool, Sc. G. *garbh pool*, rough
 pool.
 Gala, Gale, Galey, Gelly, from G. *gael*, white or clear || Geldie, Gelt.

Geirw || Gilling || Gilpin || Gipping || Girvan || Glasert.
 Glashaboy, Glashawee, Ir. G. *glais bhuide, yellow stream*.
 Glasheen, little stream || Glas-nevin, stream of a chieftain Naeidhen (Joyce).
 Glas-thule, stream of Tuathal or Toole.
 Glen-eely, W. *willow-glen* || Glen-saul, Sc. G., same as last.
 Glen-whirry, Ir. G. *gleann-a'-choire, glen of the cauldron*, from pool under cascade.
 Glide, Glyde, Gluie, Glyme || Glomach (cf. Glommen in Norway).
 Gogo ||; Goyt || Gorm-ack || Goodie || Gravey || Greta || Griff, Gryfe ||.
 Greegh, Gregg, Greece || Gruinard, Sc. G., *sunny height*.
 Grudic, Grudie || Guis-achan || Guseran || Gulbin.
 Gwain, W. gwen, *white, clear*, Gwen-draeth, *white sands*, Gwenn-ap, *white water*.
 Gwee-barra, Gwee-dore, Gwee-stin.

H.;

Hart-ford, Hart-hope (*hope northern E. for hill-side*), English.
 Hamble || Hamoaze, estuary of Tamar.
 Harwood Beck, E. *brook of the wood of hares* || Hawthorn-burn, E.
 Hazel-rig, E. from *bank of hazels* || Hebden.
 Hel, Heyl, W. *hall or heli, salt*, from sea-water.
 Hel-beck, Hell Gill Beck, probably E., from A.S. *helian, to cover*; *covered brook*, from deep trench in which it flows.
 Hermitage, E., from the valley being occupied by a *hermit*.
 Hodder || Hull || Humber.
 Hyde || Hyle.

I and J.

IDLE, Ivel, Ive || Ilen || Inny, Inn || Iowca. '
 Irk, Irthing, Irvine, Irwell.
 Isauld, personal name of woman.
 Isis, Ise, Iz, Isbourne, contain *wysg, W. water*.
 Isla || Ithan, Ithon, Ythan, Itchen, perhaps from Sc. G. *athan, fords*.
 JED.

L.

LABHAR || Lackagh || Lagan, Lug, Lugar, Ir. G. *a hollow*.
 Lam-bourne, E. *loam-bourne, i.e., mud-brook*.
 Lang-den, E. *long valley*. Lang-worth, E. *long river meadow*.
 Laver || Lauder or Leader || Laune, Lune, Lyne, Line, Lynher, Linton.
 Lax-dale, Lax-ford, Lax-ay, Norse *salmon-dale, salmon-ford, salmon-river*.

Lea, Lee, Leith, Leithen, may be corrupted from several words : best, from Sc. G. *liath*, *grey*.
 Lech, Leck, Lickle, from Sc. G. *lech*, a *stone* || Leochal || Lew, Lui.
 Lednoch || Lyon || Leet.
 Leven, 'Leaven, Leam, Leannan, Len, from Sc. G. *leamhan*, *elm* (pronounced *leven*) ; so all Gaelic scholars, but why is it that *both* the rivers *Leven* are *lake-outlets* ?
 Liddel || Liffey, Liver, Livet, cognate with W. *llif*, *flood*.
 Lowther, Luther, apparently E., same as German *lauter*, *clear* || Lochy, Sc. G. *black* (obsolete) according to Skene.
 Looe, Loughor or Llwhchw, Lodore or Lowdore, Loman, Lomon ; these words perhaps contain *lough*, *loch* or *lluch*, a *pool*.
 Loddon, Lyd, Ludd || Lossie || Lostrig' || Loxley, corruption of Lax ?
 Luce || Lundy || Lyvennet.

M.

Machry || Machany || Mahon, name of old king of Thomond, A.D. 960 || Maich || Mar, Maran, Marron.
 Marden || Mark, Marky || Manifold || Maize, Mease || Mashie || Mawrig or Mearag.
 Mealagh || Meig, Meggat || Medlock || Medina, Medwin || Mawddach.
 Mawddwy, W. *hermit*, so like E. *Hermitage* and Irish *Dysart*, i.e., *Desert*.
 Medway, same word as the Celtic *Medoac-us* in the Cisalpine Gaul of the Romans.
 Meoble || Meon ||.
 Mersey, Norse, appears on Essex coast in form, *Mersea*, i.e., *Mere's-ea*, or *tidal island* : first given to island in estuary, then to estuary ; and then extended upwards to the chief river which helps to form the latter.
 Mint-beck, E. from the common *wild water mint*. || Milk || Minnock.
 Mole or Moule || Monnow || Monynut
 Moidart || Morar || Mourne beg ||
 Moy, Ir. G. *plain*. Moy-ree, Ir. G. *king's plain*. Moy-ola.
 Multeen || Mudale || Muick, Ir. G. *stream of swine*, in W. *moch nant*, E. *swinburn*.
 Mynach, W. *monks' stream*, from *bridge built by monks*.

N

NADDER || Nair, Nairn || Nailbourn, Nell || Nanny, Nen, from W. *nant*, *brook*.
 Naven, Naver, Nevern || Ness, *an-eas*, *the fall*, i.e., Foyers, extended from lake to river.

Nidd, Nith, Neath, Nethy, resemble W. word for *nest*, but hard to see connection.

Nore, mistaken form of Feoir, which arose from coalescence of Gaelic article with word as in Ness.

Nochtie or Noughty.

O

Ock, Og-wen, Ouse, Oke-ment, Ogwr, contain G. *uisge* or W. *wysg*, *water*.

Oiskaig || Oich || Oikel || Oily || Olchon || Olbarbha || Orchy || Orwell.

Ore or Ald || Oude.

Otter-bourne, E. from animal.

Ow, Sc. G., *abh water*. || Owen, Ir. G., modified pronunciation of *abhain*, *river*. See Avon.

Owngar, Ir. G., *rough river*.

Oolagh, Owley, same element.

Ovoca, according to Dr. Joyce, is a modern revival of Ptolemy's name, evidently meant for the river now so-called. ...

P

PANG, Pengam || Palnure, see Polla || Pattaig || Peffery ||

Piddle, E. *small river* in Dorsetshire || Plym || Pringle || Prosen.

Polla, Pow, Pol-baith, Pol-kebbuck, Pol-maddy, Pol-mood, Poul-nark, all contain Sc. G. *poll*, a *pool*, with or without epithet. *Poll-beith* is *birchpool*. A diminutive or oblique form of this is Pill, local name for *Creek, small tidal brook*.

Pill-roath, W. *the red Creek*.

Pill-gwenly, W. *Gwenllian's creek*, woman's name.

R.

Raise-beck || Rathen, Rattar || Ray || Raven's bourne, Raven beck, perhaps first the *ravening or destructive stream*, afterwards by mistake connected with the *bird*. || Reed || Revel || Repath.

Rheidol || Rib, Ribble || Riccal || Riser || Rhymney, W. *marsh*. || Rhondda.

Roe, Ro, Ro-glas, Rawthey, Rotha, Rother, Rothay, best taken from G. *ruath red*.

Rook-hope, from *rooks*, E.

Robe || Roch, Roach || Roden || Ruchil, Ruel, Rule || Rutmoor—probably W. *red moor*.

S.

SAIONOSE || Salwarp || Sark || Scaddle || Schromstail || Seaton || Seiont || Seph, Seven ||

Severn, oldest form is W. *Hafren*, latinised as *Sabrina*.

Shannon, Shaun-ow, Shanoan, Ir. G., two last must mean *old river*, and so probably the first, but we can only guess at the sense. Is it *inhabited by survivals of former Iberians*?

Sanda || Shaggy || Sheech and Skiach, Sc. G. *swift* || Shinnel || Shiel, Shiven, Sheaf.

Sillee || Sid || Sirhowy || Siston || Sheen, E. *bright* || Skell || Skelpich || Sleaford.

Sligo, Ir. G. *shelly* || Slitrig || Slaney || Sluggan || Slinch || Smite || Snizort ||

Snaid, Sc. G. *thread* || Somergill || Solva, Solway || Soar, Sor-brook, Suir.

Sow, Sock, Suck, Sych—apparently explained by W. *sych*, *dry* : i.e., *liable to droughts*.

Snow-hope, E. from *snow*.

Spango, Spean, Spey || Spodden || Sprint.

Shrough, Srue, Sruh, Sroughan, Stroan, Straffan, Strue, Struell, Strule—

According to Joyce all variations of G. *sruth* and *sruthan*, a stream.

Observe English insertion of *t* in *sr*.

Stour, Stort, compared with the examples above given, may be only G. *sruth*, *stream* (cf. Stura in Cisalpine Gaul).

Steeping || Stinchar || Stracum || Stone || Stoke, E. *place* ||

Swale, Swiliate, Swilly || Swere || Swift E. || Swinhope E. from Swine.

T.

Taff, Tavy, Tay, Taw, Tawe, Taf-alog, Tain, Tame, Teme, Tamar, Thames (W. Taf-wysg, Tain, Tyne ; Ir. G., Tamh-uisge), *spreading or quiet*, from expanded estuary at high tide, or in the case of the two or three inland names from *overflowing, sluggish pools*. (cf. Tagus).

Teign, Tyne, Tyn-bay, W. Tyne, one of the names for Thames, proves the identity of meaning of these names with last.

Taitneach || Tarff, Sc. G. *bull*, from the roar. || Tarth || Tale || Tarras ||

Tane, Tanar. See Teign.

Teviot, Teifi, Teith || Tees, Teise (cf. Theiss) || Test.

Tennot || Ter, Tern || Tetney || Thurso; Norse *Thor's-a*, i.e., *Thor's river*, named from the God.

Till, Tilt || Tig || Tirry || Tinnas || Tima || Torg, Torran, Torraline, Torridon, Torridge, connected with old Celtic *tor*, *height*.

Thorn-hope, E. || Torne, Thorne (cf. Torn-ea in Sweden) || Tolka || Trent || Trothy.

Trim-oge, Ir. G. *stream of elder-bushes* || Trout-beck, E. || Tryweryn || Tweed.

Tulaken || Tuach || Tummel || Turret || Tutta || Twrch, W. *wild boar*.

U.

Ulie || Ure or Yore. In Ireland Owen-ure is Ir. G. *abhain-fuar*, cold stream.

Unsbin.

Usk, Uisk, Ugie, Use, Ouse, Axe, Ex, Esk, Exe, Isis, Ox, Wash, Wish, all variations of W. *wysg* or *gwyseg*, G. *uisge*, water.

W.

WALLDON, Wallcomb, probably E.

Wash, Guash, Wash-brook, Wish-ford. See Usk.

Wampool, Wamphray || Wauchope ||.

Wharfe, Waver, Weaver, Webber, Wefre.

Wear, Wyre, W. *estuary* || Wheeldale, Wheelock, Weel, Welland, Wily from W. *gwilli*, winding.

Wensom (in Bede Wantsumu), Went, Wenning, Winster.

Witham, Withern || Winrush or Wainrush is W. *avon rhôs*, marsh brook.

Wiske, least changed form of G. *uisge*, water.

Woundale || Wray, Wrey, Wreak.

Wnion (pronounced onion, as in soot), W. from abundance of *wild onions*.

Wey, Wye (3), from W. *gwi*, stream.

Y.

YARE, Yarrow from Sc. G. *garbh*, rough.

Yart || Yealm ||.

Yeo, from Ir. G. *eo'* (pronounced Yo), *the yew-tree*.

Yrvon, Ystwyth.

THE END.

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